

ORIGINAL

Docket No. E-01032A-99-0401



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BEFORE THE ARIZONA CORPORATION COM

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IN THE MATTER OF SERVICE
QUALITY ISSUES, ANALYSIS OF
TRANSMISSION ALTERNATIVES AND
PROPOSED PLAN OF ACTION IN THE
SANTA CRUZ ELECTRIC DIVISION OF
CITIZENS UTILITIES COMPANY

Docket No. E-01032A-99-0401

NOTICE OF FILING
SURREBUTTAL OF MARSHALL
MAGRUDER

22 August 2005

As indicated in the Procedural Order of 14 March 2005, as modified on 20 May 2005, the Surrebuttal of Marshall Magruder is hereby submitted to the Parties as of this date based on the ACC Decision No. 67506 of 20 January 2005 that ordered this docket and Decision No. 62011 to be reopened.

Respectfully submitted on this 22nd day of August 2005 to all parties.

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SURREBUTTAL

OF

MARSHALL MAGRUDER

August 22, 2004

In the

Re-opened

ACC Docket No. E-01032A-99-0401

**“In the matter of service quality issues, analysis of transmission alternatives and
proposed plan of action in the Santa Cruz Electric Division of Citizens Utilities
Companies [succeeded by UNS Electric]”
and its resultant ACC Decision No. 62011
of 2 November 1999**

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SURREBUTTAL OF MARSHALL MAGRUDER

22 August 2005

INTRODUCTION

Q. Have there been any changes to your Testimony of 8 July 2005 and Rebuttal of 5 August 2005.

A. Yes, in particular, responses to several Rebuttals are necessary to clarify the positions taken in the Magruder Testimony and Rebuttal.

PURPOSE OF THIS SURREBUTTAL.

Q. Are there some issues with which these Parties appear to agree?

A. Yes. The Magruder Testimony of 8 July 2005 and subsequent Rebuttal discussed all three subjects now before us. In Part I below, these will be discussed more fully.

- a. Service Quality Issues,**
- b. Analysis of Transmission Alternatives, and**
- c. Proposed Plan of Action.**

Q. Do you wish to respond to the rebuttals of others?

A. Yes. This Surrebutal contains responses to the UniSource Testimony and Rebuttal (Edmond A Beck), Marley Cattle Company's Rebuttal (Gary Rich), and the ACC Staff's Rebuttal (Jerry D. Smith), respectively in Parts II, III and IV of this Surrebutal. Other testimonies will be discussed during the evidentiary proceedings.

**Part I – Areas of Presumption of Concession
with the Magruder Testimony.**

1.0 Areas of Apparent Agreement of the Magruder Testimony.

Q. Why would you assume that there has been agreement with parts of the Magruder Testimony?

A. Both UniSource and ACC Staff failed to address many points and issues raised in the Magruder Testimony. Since neither used the Surrebuttal opportunity to counter, then by their silence, one can presume that both UniSource and the ACC have no counter arguments to offer to these many points and that the Magruder Testimony evidence is accepted and considered to be true until discredited by other evidence. The areas of presumption of concession or agreement are discussed below.

The statements in the Magruder Testimony that UniSource and ACC Staff did rebut are presented in Parts II and IV, respectively.

Q. What are the three subjects where agreement appears?

A. As listed above the three subjects are (1) Service Quality Issues, (2) Analysis of Transmission Alternatives, and (3) Proposed Plan of Action for the UNS Electric customers in Santa Cruz County.

Q. Are you trying to expand the scope of these hearings?

A. Definitely not. The re-opening of this case, E-01032A-99-0401, was discussed in detail by the Commissioners during the 5 January 2005 and 28 July 2004 Open Meetings. Evidentiary hearings were ordered to search for a solution to reliability concerns of Santa Cruz service area ratepayers. A second transmission line to meet the electricity demand was to be part of the search for a solution. All parties were challenged to "think out of the box." There were no restrictions or limitations put on the resultant decision. ACC Order No. 62011 was also re-opened.

As customers are aware, when the electricity is lost, it's gone. The customers are the users of the entire electric system, and some failure between their wall sockets and the generator caused this outage. All factors making up a reliable electric

1 distribution system are one for customers. Therefore, total reliability is included in
2 "quality of service." This first subject from the list addresses the total reliability to be
3 considered in the course of these hearings.

4 The second subject, "analysis of transmission alternatives," is related to the
5 objectives and solutions in that transmission alternatives could bring a redundant
6 source of electricity to the UNS Electricity customers. Four possible solutions have
7 been described in testimony and rebuttal.

8 The third subject, "proposed plan of action," is related to a schedule to
9 accomplish the solution to the first two issues.

10 As this docket shows, in 1999, these three issues were addressed, with two
11 Settlement Agreements, a Plan of Action and several supplements, in the resultant
12 ACC Order No. 62011. This also resolved the earlier reliability complaint by the City of
13 Nogales hearings.

14 In summary, Part I of this Surrebutal presents areas where no rebuttals were
15 presented, so there appear to be reasonable elements of agreement, or, conversely,
16 areas in which disagreement has not taken place.

17
18
19 **1.1 Quality of Service, Reliability, and Transmission Line Issues**

20 **Q. Are there areas in the Magruder Testimony in which these issues appear to have**
21 **been resolved?**

22 **A. Yes.** These areas of presumptive evidence are summarized as the following areas of
23 the Magruder Testimony:

- 24
25 1. Background from Part I of the Magruder Testimony; however, Appendix K replaces
26 parts of section 1.2 including figure 1.2-4, which had some mathematical errors as
27 noted by the ACC Staff.
- 28 2. UniSource did not rebut Reliability in Santa Cruz Service Area in Part II. The ACC
29 Staff does not use this industrial reliability engineering design process and
30 apparently relies on Reliability Indexes (SAIFI, CAID, and SAIDI) – all after-power-
31 loss measures. The Mean Time Between Failure (MTBF) values were undisputed.
32 Other parties have not presented reliability design-oriented statistical data. The
33 engineering design process established that outages on distribution systems, from
34
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1 substation transformer to wall plug, dominant the reliability problem in the Santa
2 Cruz service area. Further, the redundancy impact of any second transmission
3 line dominates the reduction in transmission outages.

- 4 3. Transmission in the Santa Cruz Service Area from Part III. The transmission line
5 characteristics values in Table 3.1-1 were not rebutted. The power loading results
6 in Figure 3.2-1 (from a report submitted to the ACC) were not rebutted; however,
7 the ACC Staff apparently did not understand them. These show that under all
8 loading conditions, the existing 115 kV line is not overloaded. Costs, transmission
9 line and other analyses were not rebutted.
- 10 4. Santa Cruz Service Area Electrical Supply and Demand from Part IV. UniSource
11 did not rebut the capabilities of power sources prior to the Nogales Tap as stated.
12 However, its WAPA reservations for transmission have been reduced and, to date,
13 remedial actions have not been fully explained by UniSource. None rebutted the
14 fact that the maximum power demand for Santa Cruz service area was limited by
15 assured water availability (AWS) and that about 110 MW or less is the maximum
16 demand for this area. UniSource did present a "peak demand table" that continued
17 through 2050 with unrealistic peak demands based on continual growth in Santa
18 Cruz County. The demands stated in their table are unrealistic, because the
19 Arizona Water Management Act of 1985 and amendments limit growth for the
20 Santa Cruz Active Management Area (SCAMA). People do not live by electricity
21 alone.
- 22 5. Proposed Second Transmission Line Alternatives from Part V. There was no
23 rebuttal to this section; however, upon review, Figure 5.4-3 was found to have
24 some mathematical errors now corrected in Appendix K.
- 25 6. Trade Off Between TEP and the Alternative Transmission Lines from Part VI. The
26 ACC Staff asked who developed the Trade-Off Study. The analysis in Table 6.2-2
27 was performed by this party and has been updated to include the Beck Interim
28 Solution and the Rich Solutions. The revised Part VI is in Appendix K.
- 29 7. Conclusions from Part VII. The "facts established" in section 7.1 were not rebutted.
30 Further, neither the Factors impacting improvement were rebutted nor were the
31 systemic problems at Citizens and UniSource. The conclusions were not rebutted.
32
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- 1 8. Recommendations from Part VIII. These were not rebutted.
- 2 9. Marshall Magruder Resume, Appendix A. One ACC Staff data request inquired
- 3 about transmission planning experience. This is not a prerequisite for systems
- 4 engineering, as explained. Systems engineering provides one with the knowledge
- 5 and skills necessary to solve the challenges of finding appropriate solutions to
- 6 electricity issues in the Santa Cruz service area.
- 7 10. Chronology of Significant Events involving the Second Transmission Line from
- 8 Appendix B. Errata were provided in the Magruder Rebuttal that added additional
- 9 entries.
- 10 11. Electric Reliability for Santa Cruz Service Area, 1994 to 2004, in Appendix C.
- 11 These statistics, reported by the utility, were not rebutted.
- 12 12. Reliability Engineering Analysis in Appendix D. The results of this process were not
- 13 rebutted. However, ACC Staff Rebuttal has missed the point (see Part IV below).
- 14 13. Reliability Improvements Agreed to by Citizens in 1999 and Subsequence
- 15 Compliance, Appendix E. The series of ACC Orders, Decisions, Agreements and
- 16 other reliability improvements expected by the utility servicing this area were
- 17 described and compliance indicated. Answers to many data requests from this
- 18 party to UniSource and the ACC Staff did not provide compliance evidence to the
- 19 contrary.
- 20
- 21

22 The ACC Staff questioned why a Formal Complaint had not been sent to the
23 ACC. The non-compliance issues were discovered when writing the Magruder
24 Testimony. The utilities' lack of compliance across the board is why there are
25 quality of service and reliability problems in the Santa Cruz service area. The
26 failure to install the proper equipment necessary to ensure voltage stability (such
27 as autotransformers to "boost" voltage), capacitors, voltage controllers, higher
28 capacity transformers, frequency and stability balancing equipment and other
29 required and essential substation upgrades has severely limited the operational
30 "capacity" of the existing 115 kV line. Installing a second line to improve quality and
31 reliability of service and doing that alone will not be effective.

32 The four reasons described in the Magruder Testimony about why the
33 Reliability Must Run (RMR) report by UNS Electric is faulty were not rebutted. No
34

attempts or comments by UniSource or the ACC Staff corrected these RMR errors. Basing decisions on an erroneous report is non-productive, to say the least.

14. Electricity Demands and Electricity Supply in the Santa Cruz service area from Appendix F. The Beck Testimony provided an updated "peak demand" forecast, which was added to Table F.1-1 in the errata for the Magruder Rebuttal. The process and computations for the maximum peak demands for Santa Cruz service area remained.

15. Glossary from Appendix G was not rebutted.

16. Errata to Magruder Testimony from Rebuttal Appendix H. This provided corrections and an update to the Magruder Testimony. It also provided an initial rebuttal to the Interim Solution proposed in Beck Testimony and compared it to the ALTERNATIVE.

17. Maestros Group Proposal from Appendix I was added due to a series of data requests from both UniSource and ACC Staff about this party's possible involvement with Maestros Group. Again, this party has no connection with Maestros.

18. Subtransmission Systems were discussed in Rebuttal Appendix J. Using *Electrical Engineer's Handbook* definitions, it is clear the Santa Cruz service area is actually a "subtransmission system." The Santa Cruz service area is NOT involved with bulk electricity (wholesale) transmission interconnections. Appendix J discussion shows that WECC and NERC "transmission system" reliability criteria for bulk electricity transmission are not applicable for a distribution utility, such as UNS Electric.

Q. Would you discuss some agreement with the Background description?

A. Yes. There has been no rebuttal with the fact the Santa Cruz service area is an electricity distribution utility, as presented in section 1.1 and Appendix J.

Q. Does this Distribution Utility have any problems before the Nogales Tap?

A. Mr. Beck's testimony stated that new limitations had been applied to the WAPA transmission lines between Saguaro generation Substation and the Nogales Tap in Tucson. They are rated at 120 MW as discussed in section 1.1.1. Correspondence

1 cited by Mr. Beck constricted this power through February 2008 when the agreement
2 with WAPA expires.

3 The Magruder Testimony and Rebuttal indicated that 160 MW were available
4 on the WAPA lines from Apache generation plant via the Adams Substation to the
5 Nogales Tap. There was no response, so this availability is presumed. No parties
6 challenged the fact that 20 to 22 MW were available for emergency services from the
7 Canoa substation to the Kantor. In one rebuttal response, several additional
8 substations are indicated as additional sources for the second 46 kV line.
9

10 The existing 48 MW of backup power from the Nogales Valencia turbines is
11 available as discussed in section 1.1.2 and other distributed generation discussion
12 should be presumptive evidence. The errata recalculated the power losses on the
13 existing 115 kV line downward, from 10.95% to 10.69%. The data in Figure 1.2-4,
14 Tables 1.2-2 and 1.2-3 had a mathematical error and has been corrected in Appendix
15 K.
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Part II – Surrebuttal To The Ed Beck Testimony and Rebuttal.

Q. What points you would like to discuss based on the Beck Rebuttal?

A. The following statements were made in the Beck Rebuttal:

- a. First, the Beck Rebuttal stated that a second transmission line is the “best” way to improve reliability.
- b. Second, the Beck Rebuttal implies that Marshall Magruder has not supported a second transmission line and has supported the Maestros Group plan for generation only.
- c. Third, the Beck Rebuttal discussed “thermal ratings”
- d. Fourth, the Beck Rebuttal stated that the Magruder proposal was not viable.
- e. Fifth, the Beck Rebuttal indicated that cost was not being considered adequately.
- f. Sixth, the Beck Rebuttal mischaracterized the status of the proposed 345 kV line.

Overall, Mr. Beck failed to cite sources, so vague assertions are a challenge to rebut.

2.1 Reliable Electric Service.

Q. Why do you want to rebut the Beck Rebuttal concerning “reliable electric service”?¹

A. The 345 kV transmission system proposed by TEP has not been shown by any objective means (e.g., with supporting data and analysis) to be the “best way” to improve reliability.

Summary of Beck Rebuttal.

- a. A second transmission line is the “best way to improve reliability.”²
- b. A second transmission line needs to be at least 138 kV to be adequate until 2030.³

Magruder Surrebuttal.

- a. TEP has not been shown by any objective means that Second Transmission Line Is The “Best Way” To Improve Reliability. The Magruder Testimony Appendices C and D

¹ Beck Rebuttal, page 2, lines 2 to 6.

² Ibid.

³ Ibid. Page 4, lines 1 and 2, page 5, lines 13 to 15.

provide actual reliability data, calculations, results and analysis of the total reliability conditions (quality of service) in the Santa Cruz service area for the last ten years. **Any** second, independent transmission line could reduce transmission outages from an average of 62.8 minutes per year per customer to 0.409 seconds of outage per year.⁴ **Any** "second" transmission line would improve the results as compared to the ten-year average of the existing 115 kV line. If there were two, redundant transmission lines from Tucson to Nogales, one of the two lines would be operable 99.99999878% of the time.⁵

TEP has not provided any numeric data that support transmission line "voltage" as a way to improve reliability. Shown in Table 1.1-1 below, are the "before" and "after" reliability results with and without a second transmission line in this service area:

Table 2.1-1 Reliability with and without a Second Transmission Line.

Reliability Element	With the existing 115 kV (only)	With a second 115 kV equivalent (as in the ALTERNATIVE)	With the Beck Interim Solution and Existing lines	Rich Solution (double-circuit 138 kV)	Note
Supply	0.302 seconds/year	0.302 sec/year	0.302 sec/year	0.302 sec/yr	1
Transmission	3,768 seconds/year	0.409 sec/year	<3768 sec/year	>0.409 sec/yr est. ~1 to 100sec/yr	2
Distribution	6,420 seconds/year	<6420 sec/year	6420 sec/year	6,420 sec/yr	3
Scheduled	54.0 seconds/year	54.0 sec/year	54.0 sec/year	54.0 sec/yr	4
Total	6475.07 sec/year	<6474.71 sec/year	<10,222.3 sec/year	>6474.1 sec/yr est. ~ 6500 sec/yr	5

Notes:

1. Based on Appendices C and D of Magruder Testimony, specifically pages 111 to 112 and 129.
2. 62.8 minutes = 3,768 seconds/year, the interim solution might reduce transmission outages but not due to redundancy, but possibly due to grounding improvements. No reliability values have been provided in the Beck Testimony or Rebuttal or the Rich solution.
3. 107.1 minutes = 6,420 seconds/year. The ALTERNATIVE will provide parallel routing, in the Santa Cruz service area, between substations that could be designed to tie into local distribution.
4. These are planned service outages, which could be reduced by having more distribution lines.
5. All numbers have been converted to seconds/year with a year being 365.25 days long.

In Table 1.1-1, clearly shows that DISTRIBUTION dominates reliability. Transmission outages are about half that of distribution or about one-third of the

⁴ In UniSource Response to Magruder Data Request 2-050b, the Applicants have not calculated or presented any transmission reliability data or analyses. In UniSource Responses to DR 2-050a to 2-050f, UniSource stated: "No such calculation has been made" [underlined for emphasis] for supply, transmission, distribution and service outages. In addition, the Applicants have not calculated any reliability improvements.

⁵ Magruder Testimony in Table C-3 and page 112 at 7 to 9.

problem. The Beck Interim Solution fails to address both. The Rich solution provides a transmission reliability solution; however, since this second line is not independent from the first line, it will have somewhat lower reliability than an independent line. Based on factors in the Rich Rebuttal, it will be much less than a single line (6,420 seconds of outage for the existing 115 kV) but somewhat higher than an independent line (0.409 seconds/year when both lines will be out). Without additional data, the Rich Solution transmission outage is roughly estimated to be between 1.0 and 100.0 seconds a year.

b. A Second Transmission Line needs to be at Least 138 Kv to be Adequate until 2030.

In the Beck Rebuttal to Mrs. Kurtz, the above statement is made without any foundation or basis. He does imply that the Line Siting Case No. 111 hearings had "overwhelming evidence was presented demonstrating that a 115 kV transmission line is not sufficient to meet the future loads in the Santa Cruz area."⁶ Unfortunately, those hearings were conducted with TEP and ACC Staff assertions that there was a limitation of 60 MW on all 115 kV lines. The demand forecasts⁷ were inaccurate. That 60 MW limitation has been up-dated. Mr. Beck also stated in his Rebuttal to Mrs. Kurtz, that "a transmission line smaller than 115 kV would not meet future load conditions"⁸ The Line Siting Hearings presumed only 60 MW could be carried on a 115 kV line. The Beck Rebuttal stated the existing 115 kV line has a thermal rating of 132 MW.⁹

In a response to this party's Data Request on 9 August 2005, Mr. Beck responded to the question "for how many years does Mr. Beck project the 345 kV/115 kV project will provide sufficient capacity?" The Response: "If growth in the Santa Cruz County area continues on a track similar to what has been experiences in the past, the 345 kV line should provide sufficient import capability into the area for seventy years."¹⁰ Mr. Beck must have missed section 5.1.3.5 of the Magruder Testimony showing the limit to growth reached at about 2045 in Santa Cruz County due to a

⁶ Ibid. Page 5, lines 10 to 13.

⁷ Magruder Testimony, Table F.1-1, pages 173 and 174.

⁸ Beck Rebuttal, page 5 lines 11 to 15.

⁹ Beck Rebuttal, lines 25 to 27, stated the 115 kV ACCR conductor (now in most of the existing 115 kV line) has a thermal rating of 132 MW.

¹⁰ Beck Response to RUCO First Set of Data Request 5a.

requirement for an Assured Water Supply. If this county does not sustain this capability, there will be no water entering the Tucson Aquifer from the Santa Cruz River.

Issue Summary.

1. The Beck Rebuttal failed to address the most significant reliability problem in Santa Cruz Service Area, and the Beck Interim Solution does not significantly reduce transmission outages. Therefore, the interim solution proposal should not be considered.
2. The Rich solution should be considered as a viable solution.
3. Data presented in the Line Siting Hearings were based on data found to be in error. Beck's conclusion that a line smaller than 115 kV will not be adequate is also based on this erroneous information.

2.2 Maestros Group.

Q. Why do you want to rebut the Beck Rebuttal concerning "Maestros Group"?¹¹

A. The comments about Maestros Group were both erroneous and misleading.

Summary of Beck Rebuttal.

- a. Maestros Group proposal was only for generation.¹²
- b. Marshall Magruder "now" supports a second transmission line.¹³
- c. Marshall Magruder has supported specific generation proposals to be built by the Maestros Group.¹⁴

Magruder Surrebuttal:

- a. Maestros Group Proposal Was Only For Generation. As shown in the Magruder Testimony, Appendix I, the Maestros Group plans considered transmission necessary (N-1 second line requirements) to meet various requirements. During Case No. 111, cross-examination, ACC's Mr. Jerry Smith indicated that local generation needed two ways to transmit electricity before it could be considered. In the different Maestros generation proposals (1A, 1B, and 2), this would be met.

¹¹ Beck Rebuttal p. 2 at lines 2 to 6, and page 6 lines 14 to 17. In addition, several Data Requests concerned this organization, which were included in my responses.

¹² Ibid. Page 6, lines 14 to 16.

¹³ Ibid. Lines 14 to 15.

¹⁴ Ibid. Page 2, lines 11 to 13.

b. Marshall Magruder "Now" Supports A Second Transmission Line. This party has always supported a second transmission (or better said, a subtransmission) line for redundancy purposes. The issue is what kind, where, and at what cost – the usual systems engineering considerations necessary to make a reasonable decision. Magruder Testimony, Table 6.2-2 (which Mr. Beck did not rebut) clearly showed that the proposed 345 kV line was not the best option and is an inferior option to that proposed as the ALTERNATIVE. Table 6.2-2 in Appendix K has been updated to include both the Beck Interim Solution and the Rich Solution.

c. Marshall Magruder Has Supported Specific Generation Proposals to be built by The Maestros Group. Marshall Magruder has never been associated with the Maestros Group. Their proposals, like those from PNM, AEPCO, and others, are all possible solutions for the objectives of this proceeding. Please review www.maestrosgroup.com the source of this party's information, to understand Maestros' concepts.

Issue Summary. It seems Mr. Beck has some erroneous information about Maestros Group due to lack of understanding this organization.

2.3 Thermal Ratings.

Q. Why do you want to rebut the Beck Rebuttal concerning "thermal ratings"?¹⁵

A. The Beck Rebuttal implied that "thermal ratings" were not understood by this party.

Summary of Beck Rebuttal.

- a. Mr. Magruder ignored the efficiency factor and power factor.¹⁶
- b. Mr. Magruder failed to consider the specific weather conditions.¹⁷
- c. Mr. Magruder failed to consider design margins.¹⁸
- d. Mr. Magruder failed to understand total transmission capability.¹⁹

Magruder Surrebuttal:

- a. Mr. Magruder Ignored The Efficiency Factor And Power Factor. In Magruder Testimony, Section F.1.2, scenario one, using the *Santa Cruz District Transmission*

¹⁵ Beck Rebuttal p. 2 at lines 2 to 6, and page 6 line 10 to page 10 line 11.

¹⁶ Ibid. Page 7, lines 3 to 7.

¹⁷ Ibid. Lines 6 to 9.

¹⁸ Ibid. Lines 9 to 24.

¹⁹ Ibid. Lines 11 to 19.

1.2-3 provides reserve margins with turbines on line. No such reserve margins are in the Beck Testimony or Rebuttal.

- d. Mr. Magruder Failed To Understand Total Transmission Capability. Based on responses a, b, and c above, the total transmission capability was indeed considered. The snapshot table TTC results are similar to those in Magruder Testimony Table 3.2-1 that shows power loading results using WECC planning criteria for the existing 115 kV systems. The power flow results demonstrated that the existing 115 k line loading would be less than 70% of thermal capacity for all cases evaluated by POWER Engineers.

Issue Summary. The existing transmission line has a nominal rated capability of up to 132 MW. Substation characteristics, such as inadequate and overloaded transformers, interconnections, and other transmission equipment have limited this line to capacities much less than its design or rated capabilities. These substation transmission elements can be upgraded. POWER Engineering and TEP Transmission Department recommended this in several reports. Further, the Magruder Testimony stated on page 184, "that between 99 and 109 MW is a reasonable estimate for the upper limits of peak electricity demand for the UNS Electric service area in Santa Cruz County." [Emphasis in the original] This allows more than enough margin. In addition, please see Magruder Surrebuttal comments in paragraph 4.4 below.

2.4 Magruder ALTERNATIVE Proposal.

Q. Why do you want to rebut the Beck Rebuttal concerning "Magruder Proposal"?²²

A. Comments made in the Beck Rebuttal show that Mr. Beck has not understood the ALTERNATIVE and Options One, Two and Three in the Magruder Testimony.

Summary of Beck Rebuttal.

- a. The ALTERNATIVE is Mr. Magruder's suggested resolution of reliability problems in Santa Cruz County.²³
- b. There are two parts to the Magruder proposal.²⁴

²² Beck Rebuttal p. 2 at lines 2 to 6, and page 8 line 1 to page 9 line 9.

²³ Ibid. Page 8 lines 1 to 9.

System Action Plan, used an efficiency factor (i.e., transmission losses) and a power factor of 0.98 lagging.²⁰ Power losses are in Table 3.2-1 of the Magruder Testimony are discussed further in Section 1.2, page 19 and footnote 9. This report shows the 132 MW thermal rated capacity.²¹

- b. Mr. Magruder Failed To Consider The Specific Weather Conditions. All thermal ratings are at a specified air temperature and wind speed, which has an impact on capability. No temperatures or wind speeds have been used in any data from UniSource or the ACC Staff, Therefore it is reasonable to use and compare "nominal" values. In detailed design, actual climatological and meteorological data are important design criteria. The critical needs during specific weather conditions in the Santa Cruz service area pertain to upgrades to the substation equipment. In particular, use of autotransformers to "boost" power, voltage controllers, frequency stabilization equipment and other tools of the trade need to be considered and deployed before transformer overloading, as reported in the AEPCO and two POWER Engineering studies, cause additional distribution failures.

Such upgrading also can increase the transmission capacity (remove the self-imposed restrictions) so the transmission line is used to its fullest capabilities. Installing a second, higher capability transmission line because of a lack of equipment on the original line is not a prudent expenditure. Please see additional weather comments in paragraph 4.7b below that discuss inadequate considerations by UniSource.

- c. Mr. Magruder Failed To Consider Design Margins. In Magruder Testimony, page 37, "the highest Santa Cruz load level of 95 MW (Case S1-07) when the 115 kV line was 70% loaded (with a 30% reserve below normal thermal capacity limitations.)" is one of several examples of design margins considered in this testimony. Table 1.2-2 provides estimates of supply margins for the existing 115 kV line at each substation while Table

²⁰ This report originated with the utility, I assumed that I did not have to explain as such understanding was expected.

²¹ This was from the same utility report, not from a "catalog cut sheet of conductor characteristics" and was so referenced in the Magruder Testimony. [Beck Rebuttal, page 7. line 5]. Also, the Beck Rebuttal, on page 5 lines 25 to 27 state that a 115 kV line using the ACCR conductor, as the present line uses, has a thermal rating of 132 MW.

- c. Mr. Magruder's proposal relies on day-to-day use of the existing 46 kV line.²⁵
- d. Two-county financing impacts the 46 kV line.²⁶
- e. Restoration of service and continuity of service is discussed.²⁷
- f. The 46 kV line provides additional power sources to Santa Cruz County.²⁸

Magruder Surrebuttal:

a. Mr. Magruder's Suggested Resolution Of Reliability Problems In Santa Cruz County.

Mr. Beck, in his Rebuttal, shows he missed the point in the Magruder Testimony that many factors impact reliability, and, in particular, distribution reliability is the major problem. Outages on the distribution system from the substation to the wall plug are much more frequent than outages on the transmission line. There are too many incomplete actions and unfulfilled promises that need to be accomplished in order to meet prior ACC Orders and Settlement Agreements discussed in Appendix E and additional Testimony conclusions on pages 86 and 87 of the Magruder Testimony. Mr. Beck seems to have overlooked this whole necessary and required area of work to be completed to improve reliability substantially.

b. There Are Two Parts to the Magruder Proposal. Mr. Beck stated that The Magruder Testimony proposed two Options, not three. All three are discussed in Magruder Testimony in Section 5.4 (pages 62 to 69).

Parts of Option One were skipped or misunderstood. For example, the existing 46 kV and extension to Sonoita substation are double-circuited 46 kV lines, with a total of 44 MW of capacity. Option One also includes the "Nogales Loop" using a 46/13.2 kV transformer at the location of the TEP proposed Gateway substation, as planned by Citizens, years ago, to offload the overloaded Valencia transformers. The second Nogales substation is necessary for higher distribution reliability for Nogales. This second substation is not optional, but is essential in the ALTERNATIVE.

Option Two would use a 115 kV between Valencia and Gateway and consider using 115 kV to Sonoita from Gateway. The ACC and City of Nogales have already approved the Valencia-Gateway 115 kV line.

²⁴ Ibid. Lines 3 to 6.

²⁵ Ibid. Lines 11 to 18

²⁶ Ibid.

²⁷ Ibid. Lines 16 to 18.

²⁸ Ibid. Page 9, lines 5 to 9.

Option Three would add up to 100 MW generators at Gateway and was not mentioned in Mr. Beck's rebuttal. Option Three involves installing up to 100 MW of generators after the new El Paso Natural Gasline is in, expected mid-2008. The trade-study in Table 6.2-2 assessed a 60 MW generation capability for Nogales.

- c. Magruder's Proposal Relies on Day-To-Day Use of the Existing 46 KV Line. The "emergency" character of the Canoa-Kantor 46 kV line segment is understood and clearly stated in the Magruder Testimony. The second line (46 kV) between Kantor-Canez-Sonoita-Gateway-Valencia-Sonoita is UNS Electric owned. From Kantor south, that line is inside the UNS Electric service area, and, therefore, is not under the "two county" rule. This second subtransmission line is a parallel capability that gives the flexibility to route power to substations, whenever the existing 115 kV line between Kantor and Valencia (or Gateway) is inoperable. The Beck Interim Solution and 345 kV line solutions failed to provide this routing and flexibility capability to the substations as shown in Figure J. 5.4 of the Magruder Rebuttal.
- d. Two-County Financing Impacts the 46 Kv Line. Two-county financing affects only the Canoa-Kantor line, e.g., the interface between TEP and UNS Electric. This rule does not affect UNS Electric use of its own lines within Santa Cruz County.
- e. Restoration of Service and Continuity of Service. Continuity and restoration of Service is discussed in detail in Magruder Testimony, specifically in Section D.5.
- f. The 46 KV Line Provides Additional Power Sources to Santa Cruz County. The 46 kV line to the Santa Cruz service area is a backup, emergency power source. Whenever the TEP two-county financing expires, it could presumably be used as a power source, assuming the PWCC Purchase Power Agreement, expiring in May 2008, is changed.
- g. Issue Summary. Mr. Beck did not describe the ALTERNATIVE and its Options 1, 2 and 3 correctly.

2,5 Potential Costs.

Q. Why do you want to rebut the Beck Rebuttal concerning "Cost"?²⁹

A. Mr. Beck's Rebuttal implied that costs were not considered adequately in the Magruder Testimony.

²⁹ Beck Rebuttal p. 2 at lines 2 to 6, and page 9, line 11 to page 10 line 4

1 Summary of Beck Rebuttal.

- 2 a. The Cost was not being considered adequately.³⁰

3 Magruder Surrebuttal:

- 4 a. The Cost Was Not Being Considered Adequately. The Magruder Rebuttal discussed
5 and compared the proposed "Interim Solution" with the generation and transmission
6 options provided by Mr. Beck. This Surrebutal provides a trade study comparison with
7 the Interim Solution and the Rich Solution in Appendix K. As shown, the Interim
8 Solution is the worst overall, including cost, of the four assessed. The TEP 345 kV is a
9 little better, while the Rich solution is much closer to the evaluations for the
10 ALTERNATIVE. No solution scored 100 points. The discussion in the Beck Rebuttal
11 about UNS Electric only being responsible for 3.5 miles of 115 kV and associated
12 substation facilities does not agree with either the TEP Testimony before the Line
13 Siting Committee or the accepted CEC Application and its associated Project
14 Development Agreement. In addition, Mr. Beck has testified in this present docket that
15 the Santa Cruz ratepayers will pay 20% of the costs for the 345 kV line. This
16 statement agrees with additional testimony by Mr. Pignatelli before the Commission
17 during the Citizens Acquisition hearings.

18
19 The Interim Solution fails to provide a "second transmission" line and thus does
20 not comply with ACC Order No. 62011. There is no indication of when UNS Electric
21 would have a second transmission line to meet the 31 December 2003 mandated "in-
22 service" deadline.

23
24 No system is 100% reliable or completely "robust" (whatever "robust" means).
25 Increased reliability costs money. A "J" curve depicts the situation – every incremental
26 improvement increases cost geometrically, not linearly.

27 I ask is 0.409 seconds of transmission outage a year not an adequate
28 improvement when compared to over an hour a year now?

29 Issue Summary. The discussions concerning costs in the Beck Rebuttal were not considered
30 adequately, as both the Magruder Testimony and Rebuttal derived costs for a much
31 wider range of solutions, including a Cost-Benefit Analysis that has been updated in
32

33
34 ³⁰ Ibid. Page 9, line 11 to page 10 line 4.

Appendix K. TEP's 345 kV proposals has not been included in any of the cost-benefit documentation other than in Magruder's Testimony.

2.6 Status of the 345 kV Line.

Q. Why do you want to rebut the Beck Rebuttal concerning "the status of the 345 kV line"?³¹

A. The comments presented by Mr. Beck were both misleading and erroneous.

Summary of Beck Testimony and Rebuttal.

- a. UNSE and TEP have pursued the permitting process since 2000.³²
- b. Concurrently with the CEC process, UNS Electric and TEP applied for a Forest Service permit.³³
- c. UNSE and TEP applied to the U.S. Forest Service for a right-of-way.³⁴
- d. UNSE and TEP applied to the U.S. Department of Energy for a Presidential permit.³⁵
- e. Both the Presidential permit and Forest Service right-of-way required an EIS.³⁶
- f. The EIS process has been a long and arduous task.³⁷
- g. The U.S. Forest Service selected the "central" corridor as the preferred route for the 345 kV line.³⁸
- h. Because the CEC and US Forest Service routes differ, additional time is needed to resolve this dilemma.³⁹

Magruder Surrebuttal:

- a. In 1999, Citizens initiated efforts to acquire a conditional use permit through the Coronado National Forest for a second 115 kV transmission line to meet the requirements of the ACC Order No. 62011. UniSource acquired Citizens on 11 August 2002, when UNS Electric was created as a subsidiary of UniSource.

³¹ Beck Testimony page 10 at line 16 to page 17 line 3.

³² Beck Testimony, page 10 line 17.

³³ Ibid. Lines 20 to 22.

³⁴ Ibid.

³⁵ Ibid. Lines 22 to 24.

³⁶ Ibid. Lines 24 to 25.

³⁷ Ibid. Lines 25 to 26.

³⁸ Ibid. Page 10 line 27 to page 11 line 1.

³⁹ Ibid. Page 11, lines 1 to 3; Beck Rebuttal, page 1, line 11 and page 4 lines 11 to 13.

- b. As shown in the Magruder Testimony, Appendix B, Citizens applied for use of the designated Coronado National Forest utility corridor for its 115 kV line and was exploring a team agreement with PNM at that time.
- c. As shown in Magruder Testimony, Appendix B, Citizens and TEP changed the original designated utility corridor application to include a "new right of way" in June of 2000, long before UNS Electric existed.
- d. TEP applied for a Presidential permit on 17 August 2000. Neither Citizens nor UNS Electric (which did not exist) were included in that application.
- e. An EIS is required when significant environmental damage might result from an action. The agency granting the "permit" makes this decision. Many Presidential permits do not require an EIS. The two permits presently held by UNS Electric did not. The scope of the project, with a new right-of-way applied for, resulted in the requirement for an EIS to allow all decision makers to use one set of the best environmental information for decision-making.
- f. TEP was not prepared for an EIS and chose to obtain an ACC CEC first. This was contrary to the plan proposed by Citizens, which completed the environmental review requirements prior to going to the Line Siting Committee for a CEC. In fact, TEP was so ill prepared that during a June 2001 Line Siting Committee meeting TEP had to agree to "toll the clock" to pursue further information. The Chairman told TEP that the choices were either "toll the clock" or the committee would have to disapprove a CEC due to the lack of environmental information. The Line Siting Committee initial vote did not approve a CEC; the vote resulted in a tie. In that case, the CEC would be automatically grated without any conditions. Over 30 conditions are attached to this CEC, thus one Committee member changed his vote in order to ensure that these conditions be imposed.
- g. The Forest Service "central" corridor route is that part of the much longer TEP Central Route that uses the designated utility corridor, modified to avoid newer roadless area. The approval by the Forest Service is only for that part of the route through the US Forest System. The Line Siting Committee in June of 2001 decided that the Eastern and Central routes were not viable and, therefore, did not consider these two routes

1 for the rest of the Siting Committee hearings. The final CEC specifically denied their
2 central route.

3 There is no dilemma, permission was NOT granted. TEP has failed to understand that it does
4 not have a contiguous route and must find another way. The Magruder Testimony
5 suggested a route that should benefit TEP. It was not rebutted in their Rebuttal.
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Part III – Surrebuttal To The Gary Rich Rebuttal.

Q. What points from the Gary Rich Rebuttal⁴⁰ would you like to discuss?

A. There are four.

- a. First, the Rich Rebuttal provided the “Rich Solution” for a second transmission line, based on the Beck Interim Solution, provides an orderly way to meet the second transmission line and benefits to Santa Cruz service area.
- b. Second, the Rich Solution may not satisfy the ACC concerns.
- c. Third, the Rich Solution may be a more costly solution than the ALTERNATIVE.
- d. Fourth, the Rich Solution is compared to the Beck Interim Solution, the TEP 345 kV line, and the Magruder ALTERNATIVE Options 1, 2 and 3. See Appendix K, Part VI.

Q. Is Mr. Rich is qualified to provide technical information at these hearings?

A. Yes, as he appears to have better qualifications than Mr. Beck and Mr. Smith. We will have an opportunity to assess this during the oral arguments.

Q. Have Mr. Rich and Mr. Magruder ever met before or ever discussed this case?

A. No, the only communications between us has been via Testimony, Rebuttals and Surrebuttal. From his Rebuttal, it appears he understands the major issues in this proceeding.

3.1 The Rich Rebuttal to provide a proposal a second transmission line.

Q. Why do you want to rebut this issue?

A. The Rich Solution needs to be discussed and clarified before a trade-off decision can be made.

Summary of the Rich Rebuttal:

- a. Second Transmission Line Requirements.⁴¹
- b. Ways to improve reliability in Santa Cruz County.⁴²
- c. Double-Circuit Advantages.⁴³

⁴⁰ The Rebuttal Testimony of Gary Rich, on behalf of the Marley Cattle Company, dated 5 August 2005, hereafter “Rich Rebuttal” contained a solution to meet the second transmission line mandate, which will be described at the Rich Solution in this Surrebuttal.

⁴¹ Ibid. Page 2, lines 1 to 9.

⁴² Ibid. Page 2, lines 4 to 9.

- d. Double-Circuit Disadvantages.⁴⁴
- e. Ways to Reduce the Visual Impacts of Double-Circuit Steel Poles.⁴⁵
- f. Costs for double-circuits.⁴⁶
- g. What should be the Voltage Rating for the Rich Solution?⁴⁷
- h. Plan of Action.⁴⁸

Magruder Surrebuttal.

- a. Second Transmission Line Requirements. The Rich Rebuttal lists three items needing change. First is the PWCC contract to provide power through May of 2008. Second are the two-county restrictions that end in 2007 for UNS Electric. Third is the WAPA limitation of 65.8 MW at the Nogales Tap.
- b. Ways to improve reliability in Santa Cruz County. The replacement of wooden poles with steel structures will assist in reducing back flash since the grounding will be better. Installing concrete barriers around the base of steel structures reduces exposure and damage from motor vehicles. Design for higher wind speeds than the minimum in the National Electrical Safety Code and design to decrease the overloading factor would provide higher reliability. Using additional "loops" would provide for multiple circuits, as shown in Figure J.5-3 of the Magruder Rebuttal. Reducing the lightning "shield angle" to zero degrees (directly over the conductors) will reduce the probability of lightning outages due to shield angle failure. Isolating overhead shield wires from the substation ground grid will significantly reduce the possibility of a lightning strike hitting a transmission line and traveling into a substation causing circuit breakers to open. Conducting vibration studies to provide for dampers to eliminate conductor damage due to Aeolian vibrations. All of these attributes will improve reliability. Neither UniSource nor the ACC Staff has presented these possibilities for improving reliability.
- c. Double-Circuit Advantages. No new transmission corridors, Forest Service permits, or State Lands Commission or any other rights-of-way are needed. Crossing sensitive

⁴³ Ibid. Page 4, line 22 to page 5, line 7.

⁴⁴ Ibid. Page 2, line 25 to page 3, line 2.

⁴⁵ Ibid. Page 5 lines 8 to 13.

⁴⁶ Ibid. Page 4, line 23 to 26.

⁴⁷ Ibid. Page 1, lines 18 to 21, line 25 to page 2 line 4, lines 10 to 17, lines 21 to 22, page 4, line 23 to page 5, line 7.

⁴⁸ Ibid. Page 3, lines 6 to 8.

properties is eliminated. Environmental impacts are not changed. Double-circuits are used throughout the United States for distribution utilities such as the Santa Cruz service area. Two circuits can have twice the power or two different voltages, such as 138 kV and 69 kV. The use of multiple circuits, such as two substations on one circuit, the other two substations on the other circuit, provides for two independent loops, to improve system reliability.

- d. Double-Circuit Disadvantages. The use of six instead of three conductors would require higher and larger poles affecting views. Outages occur very rarely simultaneously on both circuits.
- e. Ways to Reduce the Visual Impacts of Double-Circuit Steel Poles. In Santa Cruz Valley, impacts on visibility are important. Mr. Rich suggested using dulled galvanized steel poles or painted poles with non-specular conductors. This party feels that the contrast between the natural background and the pole is a major factor in "seeing" the poles. When the sky is the background, the dull galvanized steel or painted poles should be used and in a forest with many trees when this party would recommend weathering steel poles. Since there is a line in the existing 115 kV right of way, using visual reduction methods, such as reducing contrast and switching to monopoles should have a higher community acceptance instead of using a new right-of-way.
- f. Costs for Double-Circuits. The second circuit as a double-circuit on the existing right-of-way, when rebuilding, is about 30-40% the cost of a new line on a new right of way. There will be a slight increase in cost since poles for double-circuits are higher and heavier than single circuit poles and three 138 kV insulators, a second overhead shield wire, conductor and conductor installation might be used.
- g. What should be the Voltage Rating for the Rich Solution? Using the Beck Interim Solution as his basis, Mr. Rich proposed a change from 115 kV to 138 kV – compatible with TEP's system. He also -thought that a double circuit 115 kV and even an additional 69 kV might be adequate.
- h. Plan of Action. The Rich Solution recommends upgrading the existing line after new 20 MW LM2500 generation is installed in Nogales. With 48+20 or 68 MW of local generation, selected outages on the existing transmission line can occur without losing service to customers.

Issue Summary. Other than cost impacts, the advantages of the Rich Solution are similar to those provided by the 46 kV double-circuit ALTERNATIVE.

3.2 The Rich Solution may not satisfy the ACC concerns.

Q. How could the ACC not approve the Rich Solution?

A. During the Line Siting Hearings, the ACC Staff required that even distribution lines not be attached to the 115 kV line poles from the Gateway substation. This might not be a major issue based on the Rich Rebuttal.

3.3 The Rich Solution may be more Costly than the ALTERNATIVE.

Q. What would make the Rich Solution more expensive than the ALTERNATIVE?

A. A 138 kV system is more expensive than a lower voltage system. See the cost per mile in the Magruder Testimony Table 3.3-1 which indicated that a double 69 kV line costs \$380,000 per mile while a double 138 kV line costs \$540,000 per mile, about 70% more for about 100% more power. The thermal rating for 138 kV is about 158.4 MW, 115 kV about 132 MW, double 69 kW is 66 MW, and double 46 kV is 44 MW.⁴⁹

⁴⁹ Magruder Testimony, page 35 lines 15 to page 36 line 2 with footnotes 35 and 36.

Part IV – Surrebuttal To The Jerry D. Smith Rebuttal.

Q. What points you would like to discuss from the Smith Rebuttal?

A. The following nine points are important:

- a. First, the Smith Rebuttal discussed Marshall Magruder's involvement with this and other cases concerning electricity in Santa Cruz County.⁵⁰
- b. Second, the Smith Rebuttal characterized the Magruder Testimony in this case.⁵¹
- c. Third, the Smith Rebuttal indicated some of Magruder Testimony was not relevant.⁵²
- d. Fourth, the Smith Rebuttal disagreed with the rating of the Existing System.⁵³
- e. Fifth, the Smith Rebuttal disagreed with the probabilistic reliability modeling.⁵⁴
- f. Sixth, the Smith Rebuttal disagreed with the ALTERNATIVE – which he referred to as the Marshall Plan.⁵⁵
- g. Seventh, the Smith Rebuttal agreement with the Beck Interim Solution.⁵⁶
- h. Eighth, the Smith Rebuttal opinion of the Beck Interim Solution.⁵⁷
- i. Ninth, the Smith Rebuttal Conclusions.⁵⁸

4.1 Marshall Magruder Involvement with Electricity in Santa Cruz County.

Q. Why do you want to rebut the Smith Rebuttal on this issue?

A. Many of the comments in the Smith Rebuttal are erroneous. Below is a summary of his Rebuttal and the Surrebuttal.

Summary of the Smith Rebuttal:

- a. Energy Commissioner status.⁵⁹
- b. Technical expertise.⁶⁰
- c. Boast about his crusade against TEP, UNS Electric and Citizens.⁶¹

⁵⁰ Rebuttal Testimony by Jerry D. Smith, ACC Staff dated 5 August 2005 (hereafter Smith Rebuttal), page 8 lines 18 through page 10.

⁵¹ Ibid. Page 11 line 1 to line 13.

⁵² Ibid. Page 11 line 15 through page 12.

⁵³ Ibid. Page 13 line 8 to page 15 line 7.

⁵⁴ Ibid. Page 15, line 7 to line 25.

⁵⁵ Ibid. Page 16, line 1 to page 18 line 2.

⁵⁶ Ibid. Page 18, line 5 to line 22.

⁵⁷ Ibid. Page 19, line 2 to page 20, line 19.

⁵⁸ Ibid. Page 21, line 22 to page 21 line 19.

⁵⁹ Ibid, Page 9, lines 6 to 17.

⁶⁰ Ibid. Page 9 line 19 to page 10 line 7.

- d. Magruder's opinion about second transmission line and "gateway" project.⁶²
- e. Relationships with Maestros Group.⁶³
- f. Municipalization.⁶⁴
- g. Mexican synchronization.⁶⁵

Magruder Surrebutal:

- a. Energy Commissioner Status. I was appointed to the Joint City of Nogales and Santa Cruz County Energy Commission by letter signed by the Mayor of Nogales in January 2001. These appointed members of the Commission were given the title "Energy Commissioners" by these governments. During the first session, I was elected Vice-Chairman. We met weekly through June of 2001. Our role was specific: to prepare descriptions and analyses so that both City and County officials could learn about the situation and make decisions about various energy issues. One of the first requests from the Mayor concerned immediate municipalization of Citizens. In our reply, we did not recommend that without some very clear separation of elected officials from the operation of the utility. We also assessed the three options for electricity, the TEP proposal, the PNM proposal, and the Maestros Group proposal. Due to heavy marketing by TEP, the other two proposals were not represented. I became the voice ensuring all sides were presented as fairly as possible. PNM was very responsive to data requests as was Maestros. Maestros presented several detailed papers to the group. During the commission sessions, the TEP CEC application was issued, 1 March 2001. After requesting a copy of this application from TEP and not receiving it, in frustration, I applied to intervene. I, then, drove to Phoenix and to ACC Docket Control to obtain a copy of the CEC application for use by the Energy Commission.

⁶¹ Ibid. Page 10 lines 9 to 20.

⁶² Ibid. Page 9, lines 14 to 16.

⁶³ Ibid. Page 10, lines 14 to 20 where Mr. Smith states "He also has ardently opposed TEP's proposed interconnection with Mexico on the unsubstantiated ground that the two countries electric systems cannot be reliably interconnected synchronously, while at the same time being associated with a proposed Maestros power plant project that seeks to deliver energy to Mexico, the wholesale WECC market, and retail customers in Santa Cruz County. Mr. Magruder's current testimony continues to reflect a person conflict in commercial interest." This statement about the association with Maestros is an absolute lie.

⁶⁴ Ibid. Lines 12 to 14. This party's opposition to the Citizens acquisition by UniSource was primarily related to the PPFAC issue and the \$138 million that Citizens lost. In that part of the case, I was the only one supporting Citizens, which was, in my opinion, taken to the cleaners by PWCC over a disputed series of overcharges.

⁶⁵ Ibid. Lines 14 to 16.

1 TEP never did provide us with a copy. The CEC Application provided the only real
2 information we had from TEP, other than statements at meetings about how great
3 "competition" would be for Santa Cruz County consumers. We might be able to select
4 which transmission line/utility (Citizens or TEP) we wished for our electricity.

5 The Chairman seemed to believe that the TEP 345 kV would provide the second
6 source, so we could have competitive rates.

7
8 The Commission was meeting during the California energy crisis and a period
9 when Citizens rates were in dispute with APS/PWCC. Citizens was cooperative during
10 these sessions. Citizens provided the best "data" inputs to the Energy Commission. I
11 drafted a document, as requested by the Commission, called "Findings: Technical
12 Issues" which went into details about issues involving electricity, including a Trade-Off
13 Study comparing various options. This was presented as a part of TEP Exhibit TEP-11
14 during the Line Siting hearings.

15 At that point, the chairman decided to draft his own opinion recommending the
16 TEP proposal and disregarding all other Commission work. During the first weekend
17 of June 2001, the chairman tried to get Commission "approval" for his
18 recommendation for the TEP proposal. He did this by phone although, as a
19 governmental body, we would be governed by the Arizona Open Meeting rules. The
20 chairman's opinion recommended the TEP proposal and was contrary to the overall
21 five months of discussions. For example, I agreed that a second transmission line
22 was required that needed about 100 MW of power for the service area. The County
23 Board of Supervisors agreed and proposed a Western corridor. The City approved the
24 345 kV Western corridor. I disagreed with this last minute, maneuvering in the
25 Chairman's report. I wrote a technically sound, dissenting opinion. After the last
26 meeting on 4 June 2001, I was the only Commissioner who remained interested in
27 keeping up-to-speed with various energy issues in our county. I would give short
28 "public comments" to the Board of Supervisors and the City Council about relevant
29 issues. The County Supervisors, on several occasions directed that I use the title,
30 "Energy Commissioner". Mr. Smith, of course, knows that I have never claimed to
31 speak for the Commission or for the people of Santa Cruz County.
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1 I still make periodic "public comments" to both bodies. With the demise in
2 September 2000 of the required "Citizens Action Council (CAC)" set up by the City of
3 Nogales and the ACC Staff Settlement Agreements with Citizens, there is no other
4 forum for the public to keep informed. I have taken on this role, without pay and at
5 great expense in terms of both time and dollars, to keep all informed, as well as I can.

6 Earlier this week I made about 3 minutes during public comments at a Chamber of
7 Commerce meeting to inform them there are four solutions (Interim Solution, TEP 345,
8 ALTERNATIVE, Rich) being discussed.

9 As a citizen in a Democracy, I have the right and the responsibility to review what
10 my elected officials and government employees do and comment if necessary. It
11 shouldn't be necessary to say this, but apparently, it is.

- 12
13 b. Technical Expertise. The Beck and ACC Staff documents in this case are simple and
14 non-detailed. An EE degree is certainly not warranted or necessary. My experience in
15 undergraduate EE courses at the Naval Academy and graduate-level EE courses at
16 the University of Rhode Island, actual hands-on shipboard electrical plant operations,
17 gas turbines, and systems engineering have provided me with the necessary basis to
18 understand and make much more complex decisions. Two Masters degrees, one in
19 Physics and the other in Systems Management, give me with the capability to read
20 and understand many subjects including EE. May I say that the *EE Handbook*,
21 referenced in my Testimony, is not beyond my capability?
22

23 The Smith Rebuttal indicated that I have not provided power flow information
24 (see Magruder Testimony Table 3.2-1) for the existing 115 kV transmission line as
25 required by the ACC Staff "Santa Cruz District Transmission System Action Plan" This
26 information was submitted six months after TEP's CEC approval. This is the source
27 document showing the 132 MW capacity for the existing 115 kV line discussed in
28 footnote 1 of the Smith Rebuttal.

29 I have not claimed to be an electricity industry "expert." I stand by my short
30 resume in Magruder Testimony Appendix A. As this Testimony stated, EE, CE, CS,
31 HFE, ME and many other disciplines work for systems engineers, who might
32 coincidentally be an EE or ME. The system is more than just electrical data, flow
33 diagrams, transient stability, post-transient voltage or short circuit studies. These are
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1 components that are integrated with SCADA, operations, maintenance, financial, and
2 management tasks. The integration of many diverse skill sets and the ability to "drill
3 down as far as required" when a problem arises, is my job. Please review the detailed
4 resume I submitted in order to answer this type of statement before it arose.

- 5 c. Crusade against TEP, UNS Electric, and Citizens. As a citizen of the United States, I
6 spoke before the Line Siting Committee and the ACC. It is a privilege and a right to be
7 able to do so. I feel more citizens should participate, however, it is often too costly or
8 time-consuming to do so. If Mr. Smith wishes to review my statements about the
9 entities he lists, I will be happy to do so. However, this is certainly irrelevant to finding
10 a solution to the Santa Cruz service area reliability situation.

11 *"Eternal Vigilance is the price of freedom."*

- 12 d. Magruder's Opinion About The Second Transmission Line And Gateway Substation
13 Opinion. Marshall Magruder has not opposed the second transmission line. I believe
14 the first time this was publicly stated was in a letter to the *Arizona Daily Star* on 23
15 June 2000. This should not come as any new revelation to the ACC Staff or
16 UniSource. Again, it depends where a second line starts, where it goes, and how
17 costly will it be to the ratepayers. Citizens wanted the Gateway substation to relieve
18 the over stressed transformers at the Valencia substation. The proposed 345 kV part
19 of the proposed Gateway substation is not necessary for service area reliability but the
20 local distribution part is. Please review Magruder Testimony use of the term "Nogales
21 loop."

- 22 e. Relationships with Maestros Group. I would like Mr. Smith to retract his statement that
23 "Magruder's current testimony continues to reflect a personal conflict of interest"⁶⁶ As
24 repeated in my responses to both UniSource and ACC Staff, I am not affiliated with
25 Maestros now and I never have been. Again, I would suggest that the ACC Staff read
26 the www.maestrosgroup.com website my source of information about that
27 organization.

- 28 f. Municipalization. Based on the facts available at that time, I supported
29 municipalization as a better option for both the City of Nogales and Santa Cruz County
30 ratepayers. The numbers showed this option certainly could have lowered rates.

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34 ⁶⁶ Smith Rebuttal, page 10, lines 19 and 20.

1 Unfortunately, the ballot measure lost but it was amazing how many "drunks" showed
2 up at the County Complex to count the ballots. The "drunks" were against the
3 municipalization vote.

4 In Tubac, community members had started discussions, based on the UNS Electric
5 filing to deregulate, about the possibility of an "aggregate cooperative" permitted under
6 the proposed filing. Unfortunately, the ACC has not acted upon this filing.

- 7
8 g. Mexican Synchronization. TEP still has not released any design plans that
9 demonstrate an acceptable method of preventing cascading electric failures at their
10 proposed Interconnection--US-Mexican border. Until the DOE approves a TEP
11 scheme, an Interconnection will not happen. The ACC Staff seems to have avoided
12 reviewing this issue. Apparently, reliability is much worse south of the border than in
13 Santa Cruz County, Arizona or Oregon.

14 TEP has proposed the only US Western, Eastern or ERCOT Interconnection
15 that is not safeguarded by an AC-DC-AC converter. No objective reliability analysis of
16 an Interconnection as proposed has been provided in this or any other Docket. Until
17 such is provided, the DOE comments "that no equipment" has been proposed by TEP
18 for synchronization remains, and an alteration in the proposal to include satisfactory
19 safeguard is awaited.

20
21 Issues Summary. The accusations by Mr. Smith, ACC Staff, as discussed above, are
22 erroneous, misleading, damaging, useless and irrelevant. Furthermore, they are
23 issued in the name of the Arizona Corporation Commission. Please be more careful
24 in the future.

25
26 **4.2 Characterization of the Magruder Testimony.**⁶⁷

27 **Q. Why do you want to rebut the Smith Rebuttal on this issue?**

28 **A.** Many of the Smith Rebuttal comments that characterize the Magruder Testimony are
29 erroneous.

30 Summary of the Smith Rebuttal:

- 31 a. Rewrite history.⁶⁸
32 b. Continuity of Service.⁶⁹
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34 ⁶⁷ Ibid. Page 11 lines 1 to 13.

35 ⁶⁸ Ibid. Page 11 lines 1 to 8.

1 c. Reliability Must Run.⁷⁰

2 Magruder Surrebutal:

- 3 a. Rewrite History. The Magruder Testimony has described many issues with which the
4 utility has apparently failed to comply and that the ACC Staff has apparently failed to
5 oversee. Resources are limited. I realize that the ACC Staff is limited and have, in
6 another docket, suggest that it be enlarged and that additional technical personnel be
7 assigned to perform analysis, compliance, oversight and monitoring roles.

8 In preparing for this case, various discrepancies became apparent. The Magruder
9 Testimony challenged the implementation of ACC orders in the Citizens-TEP second
10 transmission line docket. In particular, the Commission-approved Citizens plan of
11 action stated that they would complete the "environmental reviews" (e.g., EAVEIS) prior
12 to submitting a CEC Application. TEP did not follow the plan, which, in this party's
13 opinion, was the primary cause of TEP's failure to conduct an orderly NEPA process.
14 This party cannot accept TEP's complaints that the Forest Service is the problem.
15 TEP's inadequate preparation/environmental studies slowed the process. The political
16 pressure that TEP has tried to exert is extraordinary and beyond any other, I have
17 seen in over 40 years of government service.

18 Summary. TEP apparently still does not understand how to conduct a successful,
19 cost-effective and efficient review. TEP and the ACC representative who used the
20 expression "rewrite history" would benefit by reviewing history.

- 21 b. Continuity of Service. ACC Order No. 62011 did not use this expression but the rather
22 term "quality of service and reliability." The phrase, quality of service and reliability,
23 has wider connotations. The ACC Staff emphasis on this issue uses the WECC
24 reliability criteria for "Transmission" which is defined for "bulk" electricity transfers. The
25 Santa Cruz service area is a "distribution utility." As shown in Appendix J of the
26 Magruder Rebuttal, the "second transmission line" is properly defined as a
27 "subtransmission" line, one type of a transmission line. There is no need for "bulk"
28 electricity transmission to pass through this Santa Cruz service area. In a Data
29 Response, Mr. Beck was clear that this service area does not have a bulk
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34 ⁶⁹ Ibid. Lines 9 to 11.

35 ⁷⁰ Ibid. Line 13.

transmission line. Could wholesale "bulk" electricity ever be transmitted on a radial line? This answer is obviously no. The radial line into this service area is not for bulk electricity transfers.

- b. Reliability Must Run (RMR). Neither TEP nor ACC Staff rebutted the four areas discussed in the Magruder Testimony as defects in the UES February 2004 RMR Report. This party presumes these defects are correctly stated.⁷¹ Until a new RMR Report or responsible answers are provided, the RMR data, conclusions and recommendations from a defective report should not be used to make decisions concerning the Santa Cruz service area.

These are the issues that need to be separately discussed: (1) meeting future peak loads with the existing 115 kV line (as administratively constrained by the WAPA contract) and (2) the scenarios when the existing 115 kV line is not operable, and (3) Impacts of the UNS Electric installation of the 20 MW LM2500 turbine in Nogales.⁷²

- (1) Meeting the post-2006 Peak Loads. The "lights are not going to go out" in Santa Cruz County in 2007, even if only 65 MW were provided to the Santa Cruz grid from the WAPA contract.⁷³ The Table 4.2-1 below is based on the Beck Testimony uses a 65 MW maximum load from the WAPA lines.

⁷¹ Magruder Testimony section D.5.4, page 127, line 31 to page 130, line 4. In addition, the ACC "Third Biennial Transmission Assessment 2004-2013" has conclusions that were deemed to be potentially incorrect. In Docket No E-00000D-03-0047, this party filed an "Exception" to this Biennial Report stating that the results of these ongoing hearings need to be reflected in this Report. The same doubts about the validity of the RMR Report are the basis for this Exception. This Exception was filed as Exhibit 1 to the ACC Staff Rebuttal.

⁷² UniSource SEC Form 10-K of 9 August 2005 for the Second Quarter 2005, reported part of the \$ 8 million capital expenses would be spend for this installation by UNS Electric before the end of 2005 with installation completed by mid-2006. This confirms the Beck Testimony of this 20 MW LM2500 installation in Nogales.

⁷³ Beck Testimony, page 7, lines 23 to 26, stated that during peak periods, the generators with the backup 46 kV emergency line might not be able to meet the peak load. The generators have a normal rated capacity of 48 MW and the backup 48 MW line was proposed to have 22 MW and the ACC Order required the 46 kV line to be 20 MW or greater. This is equivalent to 68 MW to 70 MW of backup normally be available. The Beck Testimony used 65 MW with no basis.

Table 4.2-1 Annual Load and Hours to meet Peak Loading with Local Generation based on the Beck Testimony.⁷⁴

Year	Load Greater than 65 MW ⁷⁵		Additional Generation Required	Load on 16 MW Nogales generators
	Percent	Hours per year		
2005	0.0%	0.0 hours/year	0.0 MW	1 @ 0.0%
2006	0.1%	8.7 hours/year	0.3 MW	1 @ 1.9%
2007	0.5%	43.8 hours/year	1.7 MW	1 @ 10.6%
2008	0.7%	61.4 hours/year	3.1 MW	1 @ 19.4%
2009	0.9%	78.9 hours/year	4.4 MW	1 @ 27.5%
2010	1.3%	114.0 hours/year	5.8 MW	1 @ 36.3%
2018	Unk	Unk	15.9 MW	1 @ 99.4%
2019	Unk	Unk	18.3 MW	1 @ 100%, 1 @ 14.4%

From this table, in 2010, one of the turbines in Nogales will be required to use 36% (load/capability = 5.8/16) of its load generation capabilities 1.3% of the time when the peak load exceeds 65 MW, 114 hours per year. This is not an overtaxing or demanding generation requirement, since at least one of the three 16 MW generators should be available. Only one of the three Valencia turbines will be necessary to meet the 'peak' load requirement until 2018. After 2019, a second of the three generators would only be necessary 14.4% of the time. The Beck-proposed 20-MW LM2500 generator is not necessary to meet the peak load or RMR requirement he describes.

(2) When the Existing 115 kV line is not operable. The Beck Testimony indicated, based on the RMR Report and the worst-case scenario is the loss of 115 kV line at the Nogales tap.⁷⁶ Table 4.2-2 below shows loads above 70 MW that can be met without the ALTERNATIVE until 2007. In 2007, the ALTERNATIVE double 46 kV line could be necessary and would be sufficient through 2025. As discussed in the Magruder Testimony, additional distributed generation (DG) sources will be available, such as the Nogales International Waste Water Treatment Plant (NIWTP) generation proposal, results of the DG part of the recently approved ACC Environmental Portfolio Standard

⁷⁴ This Table combined the Beck Testimony tables on pages 7 and 8 and converted Percent of a Year into "Hours per year" in the third column. The fifth column indicated the loading of the additional generation required per year to meet

⁷⁵ Beck Testimony, pages 7, lines 9, shows 65 MW, while 68 to 70 MW are normally available for backup power and this Table used 65 MW. If 68 MW were used, about 3 years should be added to the "Year" column.

⁷⁶ Beck Testimony, page 8, line 5.

(EPS), other local renewable generation sources, and benefits from the National Energy Policy Act of 2005. The Magruder Testimony, in Section F1.1, was not refuted in the Smith Rebuttal, which stated that the total demand of 99.4 MW and 108.2 MW for this service area will occur between 2040 and 2045 based on an approximately 15% demand reduction.⁷⁷

Table 4.2-2 Annual Load and Hours to meet Peak Loading with Local Generation without the Existing 115 kV Line or the proposed TEP 345 kV Line.⁷⁸

Year	Peak Load ⁷⁹ (In MW)	Emergency Power Sources Available (Total power available is the sum of the three backup sources below)			Total Emergency Backup Power Available <u>without</u> LM2500	Excess Emergency Power <u>without</u> LM2500	Excess Emergency Power <u>with</u> LM2500 In 2006 (<u>ALTERNATIVE</u> <u>1/3 Option 3</u>) ⁸⁰
		Existing Valencia Turbines	Existing Single 46 kV line	Double 46 kV (<u>Second Line</u> <u>ALTERNATIVE</u> <u>OPTIONS 1 & 2</u>)			
2005	63.5 MW	48 MW	22 MW	Not needed	70.0 MW	+ 6.5 MW	+6.5 MW
2006	65.3 MW	48 MW	22 MW	Not needed	70.0 MW	+ 4.3 MW	+24.3 MW
2007	66.7 MW	48 MW	22 MW	<i>Recommended</i>	70.0 MW	+ 2.3 MW	+ 23.3 MW
2008	68.1 MW	48 MW	22 MW	<i>Recommended</i>	70.0 MW	+ 1.9 MW	+ 21.9 MW
2009	69.4 MW	48 MW	22 MW	<i>Recommended</i>	70.0 MW	+ 0.6 MW	+ 20.6 MW
2010	70.8 MW	48 MW	22 MW	22 MW	92 MW	+ 21.2 MW	+ 41.2 MW
2011	72.2 MW	48 MW	22 MW	22 MW	92 MW	+ 19.8 MW	+ 39.8 MW
2012	73.6 MW	48 MW	22 MW	22 MW	92 MW	+ 18.4 MW	+ 38.4 MW
2013	74.9 MW	48 MW	22 MW	22 MW	92 MW	+ 17.1 MW	+ 37.1 MW
2014	76.1 MW	48 MW	22 MW	22 MW	92 MW	+ 15.9 MW	+ 35.9 MW
2015	77.3 MW	48 MW	22 MW	22 MW	92 MW	+ 14.7 MW	+ 34.7 MW
2016	78.5 MW	48 MW	22 MW	22 MW	92 MW	+ 13.5 MW	+ 33.5 MW
2017	79.7 MW	48 MW	22 MW	22 MW	92 MW	+ 12.3 MW	+ 32.3 MW
2018	80.9 MW	48 MW	22 MW	22 MW	92 MW	+ 11.1 MW	+ 31.1 MW
2019	82.0 MW	48 MW	22 MW	22 MW	92 MW	+ 10.0 MW	+ 30.0 MW
2020	83.3 MW	48 MW	22 MW	22 MW	92 MW	+ 8.7 MW	+ 28.7 MW
2021	86.3 MW	48 MW	22 MW	22 MW	92 MW	+ 5.7 MW	+ 25.7 MW
2022	88.8 MW	48 MW	22 MW	22 MW	92 MW	+ 3.2 MW	+ 23.2 MW

⁷⁷ Magruder Testimony, page 183 lines 26 to page 184 line 13.

⁷⁸ This Table combined the Beck Testimony tables on pages 7 and 8 and converted Percent of a Year into "Hours per year" in the third column. The fifth column indicated the loading of the additional generation required per year to meet

⁷⁹ Magruder Testimony, Table F.1.1-1, as updated in the Magruder Rebuttal, pages. 174 and 174, using the latest data for each year, with Beck Testimony Exhibit 3 data for years from 2005 to 2020.

⁸⁰ The Beck Interim Solution with a LM2500 generator is one-third of the 60 MW in the ALTERNATIVE Option 3. Thus, the remaining parts of Option 3 would not be necessary until about 2025. It would be recommended that the existing Valencia turbines be replaced by LM2500 (3 x 20 MW) for 60 MW of local generation. Adding the 44 MW from the backup 46 kV line, then 104 MW will be available backup power sources. Replacement of all three Valencia turbines not later than 2030 would be prudent. Incremental replacement may upgrade local generation sooner. To repeat the Magruder Testimony, Alternative Option 3 is recommended at the Gateway substation and NOT at Valencia substation.

Table 4.2-2 Annual Load and Hours to meet Peak Loading with Local Generation without the Existing 115 kV Line or the proposed TEP 345 kV Line.⁷⁸

Year	Peak Load ⁷⁹ (In MW)	Emergency Power Sources Available (Total power available is the sum of the three backup sources below)			Total Emergency Backup Power Available <u>without</u> LM2500	Excess Emergency Power <u>without</u> LM2500	Excess Emergency Power <u>with</u> LM2500 In 2006 (<u>ALTERNATIVE</u> <u>1/3 Option 3</u>) ⁸⁰
		Existing Valencia Turbines	Existing Single 46 kV line	Double 46 kV (<u>Second Line</u> <u>ALTERNATIVE</u> <u>OPTIONS 1 & 2</u>)			
2023	89.8 MW	48 MW	22 MW	22 MW	92 MW	+ 2.2 MW	+ 22.2 MW
2024	91.6 MW	48 MW	22 MW	22 MW	92 MW	+ 0.4 MW	+ 20.4 MW
2025	93.4 MW	48 MW	22 MW	22 MW	92 MW	- 1.4 MW	+ 18.6 MW
2026	95.3 MW	48 MW	22 MW	22 MW	92 MW	- 3.3 MW	+ 16.7 MW
2027	97.2 MW	48 MW	22 MW	22 MW	92 MW	- 5.2 MW	+ 14.8 MW
2028	99.1 MW	48 MW	22 MW	22 MW	92 MW	- 7.1 MW	+ 13.9 MW
2029	101.1 MW	48 MW	22 MW	22 MW	92 MW	- 9.1 MW	+ 10.9 MW
2030	103.1 MW	48 MW	22 MW	22 MW	92 MW	- 11.1 MW	+ 9.9 MW
2031	105.2 MW	48 MW	22 MW	22 MW	92 MW	- 13.2 MW	+ 6.8 MW
2032	107.3 MW	48 MW	22 MW	22 MW	92 MW	- 15.3 MW	+ 4.7 MW
2033	109.4 MW	48 MW	22 MW	22 MW	92 MW	- 17.4 MW	+ 3.6 MW
2034	111.6 MW	48 MW	22 MW	22 MW	92 MW	- 19.6 MW	+ 0.4 MW
2035	113.9 MW	48 MW	22 MW	22 MW	92 MW	- 21.9 MW	- 1.9 MW

(3) Impact of the UNS Electric Installation of the 20 MW LM2500 natural gas Turbine. The additional 20 MW of power would change the Total Backup Power Available in Table 4.2-2 above by adding an additional 20 MW starting in 2006. From a reliability engineering viewpoint, the installation would not be recommended until a few years prior 2014, when all three existing Valencia turbines would be necessary for backup. It would, then, provide backup for one of the three (or four) turbines, i.e., one of the four turbines would be redundant, during peak power periods.⁸¹ The additional 20 MW of power would provide 112 MW (when combining the existing Valencia turbines, two 46 kV lines, the LM2500) that exceeds the highest peak demand for this service area expected about 2045. NO additional backup power will be necessary though at least 2035. The ALTERNATIVE Option Three calls for a 60 MW of local generation for backup power (replacing the existing Valencia turbines) to be installed at the Gateway distribution substation. This removes congestion at Valencia and offloads the now sometimes overloaded Valencia transformers thereby improving

⁸¹ If two of the three Valencia turbines were replaced by two 20 MW LM2500 in 2014, then 56 MW would be available for local generation or a total of 100 MW for backup, emergency power.

reliability for the City of Nogales. Implementation of the ALTERNATIVE Option 3 removes the deficiencies on backup power through 2035, based on peak power demands shown in Table F.1.1-1 of the Magruder Testimony using the latest UNS Electric peak forecasts. Furthermore, the Rich Solution, with 20 MW of the local generation, if implemented, could also result in early decommissioning of the three Valencia turbines, because no additional local generation would be necessary.

Issue Summary: Mr. Smith has made claims without basis. He only considered two of many significant issues. He claimed the ALTERNATIVE failed.

4.3 Relevance of the Magruder Testimony.⁸²

Q. Why do you want to rebut the Smith Rebuttal on this issue?

A. Too many comments made by Mr. Smith are misleading and out of context. Further, his comments are not referenced, therefore the basis for these "relevancy" charges is impossible to trace so must remain doubtful.

Summary of the Smith Rebuttal:

- a. Rewriting the PWCC contract is not relevant.⁸³
- b. Distribution is not relevant.⁸⁴
- c. Reliability Must Run is what this case is about.⁸⁵
- d. Cost of implementation is not relevant.⁸⁶
- e. Compliance with ACC Orders is not relevant.⁸⁷

Magruder Surrebutal:

- a. Rewriting the PWCC Contract. There are no comments in the Magruder Testimony that discuss rewriting the existing PWCC Purchase Power Agreement; however, this is the power contract referenced in sections 1.1, 1.1.1, 6.5, and 7.1 (fact 67) and presented without dispute. The Magruder Rebuttal in section 1.2b discussed the annual load inputs from UNS Electric, as required by the PPA, and that PWCC is responsible to deliver to UNS Electric. The PPA was not disputed. Only relevant

⁸² Beck Rebuttal, page 11 line 15 to through page 12.

⁸³ Smith Rebuttal, page 11, lines 17 to 23.

⁸⁴ Ibid. Page 12, lines 1 to 3.

⁸⁵ Ibid. Lines 4 to 6.

⁸⁶ Ibid. Page 12, lines 8 to 16.

⁸⁷ Ibid. Lines 18 to 21.

1 comments pertaining to supply of electricity for customers in Santa Cruz service area
2 was discussed. Cost of power is not relevant and not discussed. If that PPA will not
3 deliver power, then it needs to be changed. That is relevant for customers, as are the
4 energy losses on all lines factored into ratepayer cost. Mr. Smith comments are
5 irrelevant.

- 6
7 b. Distribution Is Not Relevant. Distribution is the primary cause for loss of service, as
8 clearly shown throughout the Magruder Testimony.

9 As summarized in Appendix C, pages 111 and 112, it is clear that distribution is the
10 primary reliability problem in Santa Cruz service area.

11 The second issue involves transmission, and as proven in the Magruder
12 Testimony, any second transmission line will reduce transmission outages to less than
13 half a second per year due to redundancy. Distribution outages have averaged 107
14 minutes per year, or more than two-thirds of the total outage per customer. The ACC
15 Staff Report of 19 May 2005 is mostly irrelevant as it fails to understand the customers
16 will be satisfied with 0.5 seconds of transmission outage if a second transmission line
17 is installed and that customers will not be satisfied with 107 minutes per year of
18 outages due to distribution failures.

- 19
20 c. Reliability Must Run And Continuity Of Service Is What This Case Is About. The RMR
21 issue was addressed in paragraph 4.2c above and continuity of service in Magruder
22 Testimony.

- 23 d. Cost Of Implementation Is Not Relevant. The different costs have been properly
24 characterized in the Magruder Testimony. It is clear this is not a "rate case" but this
25 evidentiary hearing will eventually result in rate changes for customers. Said another
26 way decisions from this hearing will impact future rates, because ratepayers usually
27 adsorb prudent capital costs. Please see section 5.1 of the Magruder Rebuttal and
28 Tables 1.5-1 to 1.5-4 which show cost comparisons that were not in the Smith
29 Rebuttal. Challenging major differences between capital costs estimates should be a
30 significant issue in these hearings as once capital money is spent, it is gone. This
31 party feels strongly that the significant differences in costs among the various second
32 transmission line options must be considered making these cost estimates are very
33 relevant.
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- e. Compliance with ACC Orders is NOT Relevant. If the utility had complied with the ACC Order No. 62011, this case would not have been re-opened. As shown, in many different ways in Appendix E of the Magruder Testimony, the utility failed to carry-through on promises and agreements. In particular, adding irrelevant capabilities, such as requiring a Presidential permit, creating new utility routes in the National Forest, failure to inform the Line Siting Committee and ACC Commissioners that the schedule could not be met, and poor preparation for hearings and for the EIS, are just a few examples of compliance failures that have led to the existing situation. Obviously, these are directly relevant.

Issue Summary. Mr. Smith's Rebuttal stating that certain issues are not relevant shows that he does not understand the total quality of service and reliability issues in this case.

4.4 Relevance of the Existing System Ratings.⁸⁸

Q. Why do you want to rebut the Smith Rebuttal on this issue?

A. It seemed that Mr. Smith discussed this issue as if Mr. Magruder invented "thermal ratings".

Summary of the Smith Rebuttal:

- a. The basis for Transmission capacities.⁸⁹
- b. All the pertinent factors were not considered.⁹⁰
- c. The WAPA 65.8 MW limitation was not considered.⁹¹
- d. Excess Supply.⁹²
- e. Table 1.2-1 and Transmission Capability.⁹³
- f. Line Rating

Magruder Surrebutal:⁹⁴

- a. Basis for Transmission Capacities. The 132 MW and 68 MW capacities for the existing 115 kV line were taken from the "Santa Cruz District Transmission System Action Plan" (hereafter "Transmission System Action Plan") required by ACC Order

⁸⁸ Ibid. Page 13 line 8 to page 15 line 7.

⁸⁹ Ibid. Page 13 lines 9 to 12.

⁹⁰ Ibid. Lines 13 to 18.

⁹¹ Ibid. Lines 18 to 22.

⁹² Ibid. Page 14 lines 1 to 9.

⁹³ Ibid. Lines 11 to 17.

⁹⁴ Ibid. Page 14 lines 19 to page 15 line 5.

No. 64356 Condition 21 in the Line Siting Case No. 111 ACC Docket. Mr. Smith apparently missed this reference in his reading of the Magruder Testimony. Table 2 data from the Transmission System Action Plan were used for Magruder Testimony Table 3.1-1 showed the ratings for the Del Bac and Adams Substation lines at 120 MW and 160 MW respectively. Thermal ratings are the maximum normal capacity for an electrical line. As further shown in Magruder Testimony Table 3.2-1, Power Loading Results were extracted from the Transmission System Action Plan. These results showed that the existing 115 kV line was not overloaded, i.e., was always within its design capabilities, but that the substation equipment was overloaded. Summary. The existing 115 kV line has the capacity to meet any foreseeable potential load challenges in the Santa Cruz Service Area.

- b. All Pertinent Factors Were Not Considered. The Transmission System Action Plan used the appropriate relevant factors in the power loading and modeling performed by POWER Engineers. In addition, the deficiencies noted in the Santa Cruz system were also similar to earlier power loading and modeling performed by AEPCO for Citizens. Since both of these sets of power flow diagrams had the existing 115 kV line data, use of such information from two sources and that is also being used in the Central Arizona Transmission Study Phase II analyses, meant that industry acceptance should be assured. The proper factors were considered at this phase of design. Additional factors, such as sag, specific soil grounding factors, lightning shield line locations, and other design details are important but not at this level of discussion. Additional information was provided to the ACC Staff in the Response to ACC Staff Data Request 1-14. The data presented by Mr. Beck about the capacity of the existing 115 kV line are questionable, as they reflect a doubtful RMR report, the Transmission System Action Plan and AEPCO data flow analyses.
- c. The WAPA 65.8 MW limitation was not considered. The Beck Testimony first provided the limitation numbers; therefore, the Magruder Testimony could not speak to this issue. The Magruder Rebuttal in section 1.2c did respond.⁹⁵
- d. Excess Supply. These were valid comments. The Magruder Response to First Set of ACC Staff Data Request 1-12 included an interim erratum that modified section 1.2 of

⁹⁵ Magruder Rebuttal, page 12 line 1 to page 13 line 15.

the Magruder Testimony. This modification was due to a mathematical error and included additional clarification in the associated text. This change is again included in Appendix K to this Surrebuttal.

- e. Table 1.2-1 and Transmission Capability. This was partially rebutted in paragraph 4.2(1) above. The Magruder Testimony Table 1.2-1 is an estimate for the distribution of a 70 MW load in the Santa Cruz service area. The WAPA limitation was not known when this Testimony was written; however, the Table is not related to the WAPA limitation. As shown in Table 4.2-1, the number of hours per year of single turbine operation is minimal compared to 8,766 hours in a nominal year. These turbines cost about \$80-90 per MW-hour to operate during the energy crisis in May 2001. The additional cost for 2010 usage is estimated at about \$8200 dollars.⁹⁶ Compared to cost of installation of a 20 MW LM2500 turbine, approximately \$13 million, operating the Valencia turbines is a much less expensive option. The Beck Testimony quote "this is a relatively expensive means of supplying power" seems vastly overstated and provides false justification for a \$13 million turbine that could save \$8200 in 2010. Power comes from generation and is distributed to customers. The shorter the lines, the less energy are loss. The existing system losses will be less using local generation.
- f. Line Rating. The Smith Rebuttal missed the point. The discussion about the 115 kV line was that the line is adequate, and much of the rest of the system, in particular, the substations is defective and in need additional equipment as stated in the Magruder Testimony. Obviously, any line out of service is "out of service" which was not why the capacity of the existing 115 kV line was discussed. The ACC Staff and UniSource have stated a 345 kV line is required to serve this area. Voltage is not power, Watts are power, and appropriate watts can be carried by the existing primary transmission system into Santa Cruz service area. The Table 1.2-2 on page 22 of the Magruder Testimony is for the existing 115 kV line only, outage is not a factor in that Table. The Table is used to show that the existing line has the capability to serve all customers in

⁹⁶ Cost at \$85/MW-hour for one turbine minus Saved expenses (over present PWCC rate of \$72.60/MW-hr) = \$12.40/MW-hr x 114 hr = \$1413.60/MW-hr. For 2010, for 5.8 MW x \$1413.60 = \$8,198.98. (Data from Table 4.2-1 above) and the PWCC PPA.

1 this service area. Later in the Testimony, outage impacts are discussed. The change
2 in Appendix K clarifies and corrects values in this Table.

3 Issue Summary. One section of the Magruder Testimony has been changed based on
4 an earlier ACC Staff Data request. The other comments from Mr. Smith seem
5 to indicate he is making off-handed judgments before trying to understand the
6 material in the Magruder Testimony. No mathematical analyses were provided
7 in the Smith Rebuttal to rebut those presented in the Magruder Testimony.
8

9
10 **4.5 Relevance of the Probabilistic Reliability Modeling.**⁹⁷

11 **Q. Why do you want to rebut the Smith Rebuttal comments on this issue?**

12 **A.** The standard reliability mathematical modeling was presented in Appendix D of the
13 Magruder Testimony. The NERC and WECC reliability criteria are not reliability
14 engineering models.

15 Summary of the Smith Rebuttal:

- 16 a. Six Sigma Models are not used in this industry.⁹⁸
17 b. MTBF, MTTR and Availability fail to correlate with service.⁹⁹
18 e. Adequacy and Security differ for each sector of the electric utility industry.¹⁰⁰
19 f. Appendix D is of no practical value in this proceeding.
20

21 Magruder Surrebutal:

- 22 a. Six Sigma Models Are Not Used In This Industry. These are not six sigma models but
23 rather standard system design models used worldwide. In my MBA classes in
24 Operations Management for Total Quality, these reliability models are even used by
25 administrators. A Nogales Citizens Operations Manager was a graduate of this
26 curriculum, so the concept should not be new. The use of 10-years of reliability data
27 was presented a prefect application and a model case study in the application of
28 proven reliability engineering principles. Reliability Engineering is a discipline
29 applicable to any system and is applied to all systems, from space ships to the
30 electricity turbo-generators on nuclear submarines and aircraft carriers. However, I
31

32
33 ⁹⁷ Smith Rebuttal, page 15, line 7 to line 25.

34 ⁹⁸ Ibid. Lines 8 to 14.

35 ⁹⁹ Ibid. Lines 16 to 20.

¹⁰⁰ Ibid. Line 20 to 23.

would highly recommend that this industry also apply six sigma statistical processing controls to their processes. The result would certainly be fewer outages. Section E.6 of the Magruder Testimony includes the NERC/WECC Reliability criteria state that "interconnected transmission system[s] is to move power from areas of generation to areas of customer demand (load)."¹⁰¹ Please note that the Santa Cruz grid is NOT an interconnected transmission system (as stated by Mr. Beck in his response to a Data Request). Again, it is properly classified as a subtransmission system as discussed in Appendix J of the Magruder Rebuttal.¹⁰²

- c. MTBF, MTTR and Availability Fail to Correlate with Customer Service. As stated in the Smith Rebuttal on the prior page, a "line that is out of service does not matter – service to all customers is interrupted"¹⁰³ was the key principle used for determining mean time between failure (MTBF), where a "failure" was a simple binary, i.e., either you have current or you have an outage. This is a greatly simplified the Reliability Engineering analysis.

Using customer outages, for four types of interruptions, three of which are serial. From supply to Nogales tap called "supply", from Nogales Tap to substations, called "transmission" and from substations to customer, called "distribution." In addition, the data provided by Citizens also included service interruptions, called "service."¹⁰⁴

Each of these interruptions or outages caused a failure for a customer. Thus, using the excellent statistics provided, Appendix C was developed to provide data for Reliability Engineering analysis. The "mean time between failure" (MTBF) was computed for each of these four component values. Using the duration of outages, the mean time to repair (MTTR) was computed. These calculations are not beyond what any respectable engineer should be able to do. The term availability (A) is the

¹⁰¹ Magruder Testimony, section E.6, page 147 line 7.

¹⁰² The TEP Application to the State Land Department indicated that a "subtransmission" line was being installed between Canoa and the Kantor substations.

¹⁰³ Smith Testimony, page 14, lines 23 and 24.

¹⁰⁴ The Arizona Administrative Code, § R-14-2-701.34, defines "reliability – a measure of the ability of a utility's generation, transmission, and distribution systems to provide power without failures. Reliability should be measured separately for generation, transmission, and distribution systems. Measures may reflect the proportion of time that each system is unable to meet demand or the kilowatt hours of demand that could not be supplied." In the context of a "distribution" utility, Citizens used "supply" for generation and also the fourth term "service" to account for planned outages for maintenance and equipment installations.

percentage of time a circuit is "available" for a customer, that is, the Time Period minus MTTR (duration of outages) divided by the Time period. This is discussed in the Magruder Testimony section D.1.3. Again, simple math all engineers understand by the end of their freshman year, including electrical engineers.

The only reliability engineering employed in Appendix D, involved simple probability or "probabilistic analysis" as defined by the Arizona Administrative Code.¹⁰⁵ Due to the binary (operate or fail) for circuits, one needs to use the same math as one would use in Las Vegas. These give "system" MTBF and MTTR and permit one to look at "streaks" such as if I flip a coin twice, how often will I have one "head." This is used to determine if one of the two transmission lines will be operable (not fail) in section D.2. This system is simple Reliability Engineering problem. All the steps are shown in Appendices C and D.

Summary. Obviously, Mr. Smith missed the point that customer service drove this whole analysis. Keeping all the lines closed between generation and customers was calculated. Neither the ACC Staff nor the utility provided any quantitative reliability impacts for their solutions. As discussed later, the Rich Solution can be also assessed using this process.

- c. Adequacy and Security Differ for Each Sector of the Electric Utility Industry. These two subjective terms are defined and used in Appendix E.6 of the Magruder Testimony. The associated checksheets provide a way, using the industry voluntary standard (to be replaced by a mandatory one required by the National Energy Policy Act of 2005.
- d. Appendix D Is of No Practical Value In This Proceeding.¹⁰⁶ The term MTBF is used in the WECC "Standards for Transmission Systems (I.A)," for example:

- WECC S-6 specified "a cascading outage unless the MTBF is greater than 300 years (frequency less than 0.0033 outages/year..."¹⁰⁷
- WECC-S-7 specified, "that the MTBF is greater than 300 years (frequency less than 0.0033 outages/year) ...".¹⁰⁸

¹⁰⁵ Ibid. § R-14-2-701.31 defines "probabilistic analysis – a systematic evaluation of the effects on costs, reliability, or other measures of performance of the range of possible events affecting factors which influence performance, considering the chances that the events will occur." This was used for reliability purposes as shown in Magruder Testimony Appendix D.

¹⁰⁶ Smith Rebuttal. Page 15, lines 24 and 25.

¹⁰⁷ Magruder Testimony, Table E.6-2, lines 12 and 13.

Obviously, the electric utility industry understands Reliability Engineering. This approach is practical and, in my opinion, a perfect process for locating low MTBF elements of the system, so that higher overall reliability can be "designed into" the system to prevent failures. The MTTR can be work to ensure repair crews are optimized and that faster restoration of service is objectively measured. System Availability, usually shown in a Reliability Block Diagram (with MTBF, MTTR, and A in each "box") gives one a graphic view of the location of weakest system elements. This process should be discussed in terms of "six sigma" with appropriate statistical process controls used to eliminate failures. It can be accomplished.

Issue Summary: Some one needs a course in system design using basic reliability engineering so that WECC standards can be implemented in Arizona for cascading failures that will occur if the TEP project is developed as now designed.

4.6 Electrical Viability of the Marshall Plan (ALTERNATIVE).¹⁰⁹

Q. Why do you want to reply to the Smith Rebuttal comments on this issue?

A. The Smith Rebuttal inaccurately accused this party of late filing his plan. He also believes the Alternative is not viable.

Summary of the Smith Rebuttal:

- a. Filing of the "Marshall Plan."¹¹⁰
- b. Distribution System Improvement Plan.¹¹¹
- c. Mitigate RMR.¹¹²
- d. Lack of Technical Work.¹¹³
- e. Overall Viability.¹¹⁴

Magruder Surrebutal:

- a. Filing of the "Marshall Plan." There was a series of filings in this docket starting in early November 2003, updated on 25 November 2003, with a "Recommendation for a 46 kV Alternative to meet the Transmission line mandate required by the ACC

¹⁰⁸ Ibid. Lines 14 to 16.

¹⁰⁹ Smith Rebuttal. Page 16, line 1 to page 18 line 2.

¹¹⁰ Ibid. Lines 2 to 10.

¹¹¹ Ibid. Page 16 line 13 to page 17 line 2.

¹¹² Ibid. Page 17 lines 3 to 7.

¹¹³ Ibid. Lines 8 to 20.

¹¹⁴ Ibid. Page 17 lines 22 to page 18 line 2.

1 decision No. 62011." This Recommendation... was already in this docket when the 28
2 July 2004 Open Meeting was held. It met the intentions of the Commission for
3 "alternative plans or ideas relating to the transmission reliability issue in Santa Cruz
4 County." The continual comment by the ACC Staff that "Mr. Magruder was remiss" is
5 obviously in error. Further, the Commission had not appointed the Administrative Law
6 Judge (ALJ) or Hearing Officer to manage these hearings. This case was not
7 reopened until 20 January 2005. As stated during the Prehearing Conference for this
8 case in February 2005, Marshall Magruder had not been accepted as a "party" to this
9 case until now, and that discovery was necessary in order to complete Testimony and
10 update this plan with information from the utility. The comment that "Mr. Magruder
11 waited one year to file his pleading" is also in error. Please continue to check the
12 record before making comments.
13

14 b. Distribution System Improvement Plan. This is exactly what is necessary for a
15 distribution utility, such as that in the Santa Cruz service area. The backup, secondary
16 subtransmission lines are necessary when an "emergency" exists (defined as an
17 outage on the existing 115 kV line). This service area does not "interconnect
18 transmission systems" the way most of the NERC and WECC reliability criteria
19 describe. This is a system of four substations that require two sources of electricity,
20 one being the prime, and one being a backup, emergency line. This a simple problem
21 that does not include "bulk" transmission to Mexico or new utility corridors in the
22 National Forest. Obviously, this backup, secondary system will not operate when the
23 primary system is operating. However, the ALTERNATIVE could operate inside the
24 Santa Cruz service area as an alternate way to move electricity between these four
25 substations. The Smith Rebuttal description for a Distribution System Improvement
26 Plan is correct because this is a Distribution Utility company. This was further
27 discussed in the Magruder Rebuttal in Appendix J.
28

29 c. Mitigate RMR. In addition to the Canoa substation, there are other sources for a
30 second 46 kV line into Santa Cruz County. The new Desert Hills substation (name is
31 not definite) in Santa Cruz Valley, east of 1-19, near Green Valley, is being developed
32 by TEP. There is the TEP Cyprus Sierra Substation or the AEPCO Bicknell substation,
33 all within 5 miles of the Canoa Substation that could also be "emergency" backup
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substations. The Bicknell would not have the emergency use restriction. The RMR requirements, as discussed above, are almost minimal and the resultant cost of using the local generation is close to insignificant.

d. Lack of Technical Work. The Smith Rebuttal has indicated that the POWER Engineers "Transmission System Action Plan" and "Plan of Action" are excellent documents. In the Magruder Testimony, no words of criticism were intended. These were excellent technical works and provided the basis for many of these conclusions. The use of a 345 kV, on any line larger than the existing 115 kV line, in the Transmission System Action Plan was found not necessary based on this documentation. The problems found in the Transmission System Action Plan were NOT due to the existing 115 kV line but due, in ALL cases, to inadequate equipment capabilities at the substations. Perhaps everyone needs to re-read this excellent document prior to the evidentiary hearings to ensure he or she knows where the real problems are on the Santa Cruz grid. It should be incumbent upon the utility to conduct power load studies using the ALTERNATIVE Options 1, 2 and 3, because the results should save valuable capital funds for the upgrades necessary at the distribution substations.

e. Overall Viability. The comments concerning technical and reliability viability are simply not true. Why does Mr. Smith say the staff "does not support continued consideration of Mr. Magruder's plan or any variant thereof that fails to include a second transmission line operated at a minimum of 115 kV" without giving technically and economically sound reasons? The existing 115 kV is not required if the substations were upgraded, as outlined in the AEPCO power flow studies, the POWER Engineering Transmission System Action Plan, and TEP's "Long Term Transmission Plans for the Santa Cruz County UNS Electric System."

Issue Summary. The Smith Rebuttal accused the Marshall Plan of being inadequate. The Magruder Testimony and Rebuttal has shown this false, and that the plan is a viable option or addition, an "out of the box" plan that is both secure and adequate for this, the smallest county in Arizona.

4.7 Smith's Agreements with the Beck Interim Solution.¹¹⁵

¹¹⁵ Ibid. Page 18, line 5 to line 22.

1 **Q. Why do you want to rebut the Smith Rebuttal on this issue?**

2 **A.** This section provides unwarranted praise to UniSource for the recent weather
3 conditions and blindly supports, without sound technical basis, the proposed TEP 345
4 kV project.

5 Summary of the Smith Rebuttal:

- 6 a. Improvements in the existing system.¹¹⁶
7 b. Weather impacts on the existing system.¹¹⁷
8 c. The proposed 345 kV "gateway" transmission project is the best solution.¹¹⁸
9 d. The "interim solution" is appropriate due to the delays in the 345 kV project.¹¹⁹

10 Magruder Surrebutal:

- 11 a. Improvements In The Existing System. Since mid-2004, the only improvements in the
12 existing 115 kV transmission line have been installation of the shunt capacitors
13 ordered by the Commission in 1999. The addition of the 46 kV emergency lines, as far
14 as it goes, also provided a second source of power when the 115 kV fails.
15 b. Weather Impacts On The Existing System. As shown in the Magruder Testimony, 90%
16 of all Transmission outages occur during wind and thunderstorms.¹²⁰ A Data
17 Response from UniSource, Mr. Beck indicated that it does not employ a staff
18 meteorologist but has a display of the local radar picture available in its control center.
19 UniSource also does not monitor Wind, Ice, Snow, and Thunderstorm Warning and
20 Alerts. These are basic for any utility, especially for one spread out from the northwest
21 corner of Arizona to Santa Cruz and Cochise Counties. Use of www.weatherbug.com
22 permits one to receive fairly detailed alerts on one's personal computer. A large utility
23 needs better weather information. Nature controls reliability, at the 80% level, for this
24 transmission line and 70-80% for the most unreliable part of the entire system that is
25 the distribution system. Lighting storms are adequately monitored and such
26 information is readily available in Tucson. This lack of corporate preparedness is
27 appalling and requires remedy. This party was a proven geophysics specialist during
28 his Naval career, where understanding the natural environment is critical for mission
29
30
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32 ¹¹⁶ Ibid. Lines 6 to 12.

33 ¹¹⁷ Ibid. Lines 11 to 16.

34 ¹¹⁸ Ibid. Lines 18 to 20.

35 ¹¹⁹ Ibid. Lines 20 to 21.

¹²⁰ Magruder Testimony, page 30, section 2.3 line 26.

success. The continual demonstrated lack of understanding of lightning, grounding, wind, soils, seismic activity, flooding, and other natural phenomena appears to be a systemic TEP problem that impacts overall system reliability. The last two years, with no transmission outages, could be due to favorable environmental conditions and not to system improvements; however, without adequate environmental understanding erroneous conclusions may have been developed. The statistics in Appendices C and D prove this idea. Weather protection schemes, some as proposed by Mr. Rich, are critical for improved system reliability.

- c. The Proposed 345 Kv "Gateway" Transmission Project Is The Best Solution. The Smith Rebuttal stated "The proposed 345 kV Gateway Transmission Project remains the best solution for resolving existing and future reliability concerns in Santa Cruz County. This is not at all true. Please review section 2.1a above since this repeatedly from UniSource.
- d. The "Interim Solution" Is Appropriate Due To The Delays In The 345 Kv Project. This also is not true, as discussed in section 4.8 below; this is not the most appropriate solution at any time. The delay has been primarily caused by TEP's inept actions. Let's not have more of the same. The Magruder Response to UniSource Data Request One expands the discussion of UniSource's EIS issues and inexcusable delays. Please see also section 2.5 above and the Magruder Rebuttal in sections 1.3 and 1.4.

Issue Summary. These comments from the Smith Rebuttal sound like echoes of the Beck Testimony with the same omissions and misunderstandings.

4.8 Smith's Opinion of the Beck Interim Solution.¹²¹

Q. Why do you want to rebut the Smith Rebuttal opinions about this issue?

A. The rebuttal comments are rather biased and terribly clichéd.

Summary of the Smith Rebuttal:

- a. TEP solutions are "outside the box."¹²²
- b. Only a second line above 115 kV can resolve the security issue.¹²³

¹²¹ Ibid. Page 19, line 2 to page 20, line 19.

¹²² Ibid. Lines 2 to 6.

¹²³ Ibid. Lines 6 to 8.

- c. Two-County Rule.¹²⁴
- d. Staff supports the 138 kV upgrade.¹²⁵
- e. Substantive Changes require a CEC Application.¹²⁶
- f. Questions Concerning the 20 MW LM2500 generator in 2006.¹²⁷

Magruder Surrebutal:

- a. TEP Solutions Are "Outside The Box." There is no excuse for any "interim" solutions since the ACC Staff still considers 31 December 2003 as the deadline for a second transmission line. Without even proposing a second line, the ACC Staff concurs that "thinking out of the box" means such an expensive "interim" solution. What will happens when the proposed 345 kV line is not built? There is no contingency plan for that. This solution is unsatisfactory.
- b. Only a Second Line above 115 Kv Can Resolve the Security Issue. The ACC Staff correctly understands that the "Interim Solution" does not provide a second transmission line. None is provided. Further, there are no data in this docket that provide a quantitative or objective basis for any lines greater than 115 kV to meet the back, secondary needs for this service area. Larger lines are a waste of capital and should not be developed.
- c. Two-County Rule. Only the UNS Electricity two-county rule expires in 2007. As stated in a Data Response, the TEP two-county rule is expected to continue until somewhere between 2018 and 2033.¹²⁸ The Smith Rebuttal conclusions on this issue need to be reconsidered. The possible synergy between the 2007 expiration of the UNS Electric two-county restrictions and the ending of the PWCC PPA in May 2008 needs clarification. The fact that TEP still having two-county restrictions for many years may change the ACC Staff support on this issue.

¹²⁴ Ibid. Lines 12 to 21.

¹²⁵ Ibid. Page 19 line 23 to page 20 line 3.

¹²⁶ Ibid. Lines 5 to 10.

¹²⁷ Ibid. Lines 12 to 19.

¹²⁸ Joint Applicant's Response to RUCO's First Set of Data Requests #2, 9 August 2005, which states: The [TEP] two-county restrictions are in effect through the maturity date of bonds issues on the basis of the two-county rules. The maturity dates on current TEP two-county bonds range from 2018 and 2033. If TEP issued new bonds with a longer dated maturity, two-county restrictions would apply to through the later date."

- 1 d. Staff Supports The 138 kV Upgrade. Staff support ignores the cost impacts for an
2 upgrade when there is no second transmission line. An upgrade appears to be a
3 premature step. It surely ignores the limited demand growth in this service area. The
4 issue concerning the WAPA restrictions also needs resolution prior to upgrading any
5 transmission line to this service area.
6
7 e. Substantive Changes Require a new CEC Application. This is correct and any 115 kV
8 or larger solutions will add both additional cost and time. A smaller second line is
9 faster, cheaper, easier to site—needing only local and county-level permits, and finally
10 starts the process towards the second transmission line solution.
11
12 f. Questions Concerning the 20 MW LM2500 Generators in 2006. This issue is
13 discussed in 4.2 above with relevant data and recommendations. The long-term
14 Valencia replacement program should be integrated into the new PPA agreement
15 without some of the restrictions now imposed on the Valencia turbines by PWCC. In
16 this party's response to a Staff Data Request, information about the ongoing Mexican
17 natural gasline planned to Ambos Nogales shows that by mid-2008, about 800 mmcf
18 of natural gas will flow north from Nogales, Arizona to join the EPNG line east of
19 Tucson.¹²⁹

20 Issue Summary. The ACC Staff comments on the Interim Solution do not evaluate the
21 impacts of the failure to provide a second transmission line, do not consider costs are
22 for an upgrade without assured transmission reservations, and while a new PPA
23 contract will be implemented in May 2008. These unknowns don't deter; UniSource
24 (see SEC Form 10-K of 9 August 2005) from sending up to \$8 million in UNS Electric's
25 capital funds for the LM2500 before 31 December 2005. Does this make economic or
26 reliability sense when there is no second transmission line?
27

28 **4.9 Smith's Rebuttal Conclusions.**¹³⁰

29 **Q. Why do you want to rebut the Smith Rebuttal conclusions?**
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33 ¹²⁹ Marshall Magruder Response to ACC Staff Data Request 1-15. Magruder Testimony in section 5.4.3 and
34 Footnote 165 provide this information. Google provided additional information based on a short newspaper
35 article.

¹³⁰ Smith Rebuttal. Page 20, line 22 to page 21 line 19.

1 A. They are inaccurate to say the least. Only some of his conclusions are discussed
2 below because most were rebutted above.

3 Summary of the Smith Rebuttal:

- 4 a. Staff reaffirms that a second transmission line is required.¹³¹
5 b. The Marshall Plan is not viable.¹³²
6 c. Staff's opinion is that a new transmission line must be 115 kV or larger.¹³³
7 d. The 345 kV project remains the "best" viable option for long term reliability.¹³⁴
8 e. Staff supports the interim transmission solution as long as it can be achieved by
9 2007.¹³⁵
10 f. Staff supports local generation as a long-term supply objective.¹³⁶

11 Magruder Surrebutal:

- 12 a. Staff Reaffirms That A Second Transmission Line Is Required. There is no dispute
13 that redundancy provides the additional reliability to assure transmission in this service
14 area.
15 b. The Marshall Plan Is Not Viable. The Magruder Testimony, which discussed continuity
16 of service issues, was not rebutted and may not have been read by the ACC Staff,
17 since they remain so blank.
18 c. Staff's Opinion That New Transmission Line Must Be 115 Kv or Larger. See section
19 4.6e above.
20 d. The 345 kV Project Remains The "Best" Viable Options For Long Term Reliability. See
21 sections 2.1a and 4.7c above. Upon reviewing the old and new Trade-Off Study in
22 Part VI of the Magruder Testimony (as updated by Appendix K) staff's "best" option
23 scores much lower than the 46 kV or Rich Solutions. The Interim Solution scored the
24 lowest, primarily since a second transmission line is still required.
25 e. Staff Supports Interim Transmission Solution as Long as it can be achieved by 2007.
26 As a customer, the only important date for completion is prior to the peak months of
27 June through September, thus completion and operational by May 2007 should be
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30

31 ¹³¹ Ibid. Page 20, line 23 to 24.

32 ¹³² Ibid. Page 20, line 24 to page 21 line 1.

33 ¹³³ Ibid. Lines 1 and 2.

34 ¹³⁴ Ibid. Lines 2 to 4.

35 ¹³⁵ Ibid. Lines 6 to 11.

¹³⁶ Ibid. Lines 13 to 19.

1 considered as the action date, and anything later as missing the in-service date. The
2 tasks required by May 2007 make achievement doubtful. Please note that the Rich
3 Solution considered installation of the LM2500 generation prior to starting the upgrade
4 as necessary to ensure continuity of service during the upgrade. It appears this also
5 has not been fully considered by the Staff.

- 6 f. Staff Supports Local Generation As A Long-Term Supply Objective. The staff asks
7 good questions but this action has already started.
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10 **Q. Does this conclude your Surrebuttal?**

11 **A.** Yes, it does.
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Appendix K – Surrebuttal Change to Magruder Testimony of 8 July 2005

K.1 Replacements.

This change includes three replacements as follows:

- a. Page 20 from line 6 through page 23, line 12
 - b. One page 67, replace Figure 5.4-3 with the new Figure 5.4-3 below.
 - d. Replacements for Part VI pages 70 to 73 that includes the Beck and Rich Rebuttal Testimonies.
 - e. Pen and ink changes.
-

- a. First Replacement: On the original page 20 at line 6 of the Magruder Testimony, please replace all through page 23 at line 27 with the below. First footnote is 12.

A recent UNS Electric report has assumed that the distribution of peak loads in the Santa Cruz grid would be 10% for both the first two substations, Kantor and Canez, 30% for Sonoita and 50% for the Valencia substation.¹³⁷ Using estimated of population and types of activity, in Table 1.2-1, loads were estimated independently from UNS Electric's data and in this erratum updated based on new data from UniSource. In the next few paragraphs, a "range" of peak loads for each substation will be discussed with both my estimates and UNS Electric estimates in Table 1.2-1 showing both estimates for a peak load of 70 MW.

Table 1.2-1 – Estimates of Customers and Peak Loads at Each Substation.

Substation	Estimated number of customers	Average High Customer load (kW)	Total Maximum Load at Substation	UNS Electric Loads
Kantor	1,200	4	5 MW	7 MW
Canez	1,200	4	5 MW	7 MW
Sonoita	4,000	6.5	26 MW	21 MW
Valencia	8,750	4	34 MW	35 MW
Totals	15,166	10 kW	70 MW	70 MW

In Figure 1.2-4, we see the first substation, called Kantor, near Amado, that services the Northwestern part of Santa Cruz County including Mount Hopkins, will receive 100 MW. Based on Table 1.2-1, between 5 MW (Magruder estimate) and 7 MW (USNE estimate) of power will be necessary when peak power is 70 MW.¹³⁸

Thus, as shown in red in Figure 1.2-4, using UNSE's 7 MW, then between 95 MW (100-5) and 93 MW (100-7) are available for the next substation, called Canez for the north Rio Rico area, with a load of between 7 MW (from USNE) to 5 MW (from Magruder). From Canez, then 86 MW (93-7) to 90 MW (95-5) are available for the Sonoita substation, in south Rio Rico. From Canez, then 86 MW (93-7) to 90 MW (95-5) are available for the Sonoita substation, in south Rio Rico.

¹³⁷ UniSource Energy Services, "Long-term Transmission Plans for the Santa Cruz County UNS Electric System," dated June 2004, not paginated, from "Study Assumptions" page.

¹³⁸ As is discussed later, this is approximately the latest UNS Electric forecast for the 2010 peak demand for the Santa Cruz service area when the peak load will exceed 70 MW. See Table F1.1-1 in Appendix F.

1. Nogales Tap assumed to have 100 MW available to account for line losses.
2. Example supply margin excess calculation for Sonoita, lower limit = $60/26 = 231\%$, upper limit = $69/21 = 329\%$

There still is 60 to 68 MW power remaining for Valencia Substation. This exceeds the peak Nogales load--34 MW to 35 MW -- by 25 to 34 M or between 71% and 100% (25/35 and 34/34). Therefore, under normal, no contingencies, conditions, each substation has excess power margins, including the last one. The distribution of customers and load for each substation is, of course, variable, so ranges provide reasonable estimates.

Figure 1.2-4 shows inside each rectangle representing a substation, the range of peak demand loads (for example, Valencia peak load is 34-35 MW), with the available supply for that substation (in red) from the 115 kV transmission line. Each substation's load reduces the available supply of power available for the next substation, thus, 60 to 68 MW are available to meet Valencia demands, which needs 34-35, and thus, an excess supply of 25-34 MW exists when the total system load is 70 MW.

The 68 MW constrictions to the existing 115 kV line have restricted supply to Valencia when the Nogales Tap exceeded 100 MW, in this example, 69 MW could be available (after subtracting the Sonoita load). At a 70 MW system load demand, Valencia still would have between 25 and 34 MW of excess supply. When the overall demand exceeds 125 MW, this 68 MW segment could then start to limit zero contingency supply to the Valencia substation.

In summary, without outages and without the backup 46 kV transmission line, supply exceeds demand through 2040, when the peak Santa Cruz demand forecast by UNS Electric is just 125.7 MW (see Appendix F, Table F1-1, for peak demand forecasts through 2040) that will have about 0.7 MW of restriction to the Valencia substation.

As shown in section F1.3.5, about 110 MW will be the upper limit of peak electric demand in this Service Area before new building permits will cease due to not meeting the required 100-year assured water supply (AWS) required by ADWR for the Santa Cruz Active Management Area (SCAMA).

Q. Does USN Electric use other sources for electricity in Santa Cruz area?

The Sonoita substation provides power to most of the county's industry and the largest consumer, the Nogales International Wastewater Treatment Plan (NIWTP). On a 70 MW peak day (from Table 1.2-1), the Sonoita substation will need between 21 MW and 26 MW of power. A maximum of 68 MW will be available to Valencia (90-21=69 but is limited to 68 MW due to line constraints) to a minimum of 60 MW (86-26) available for the Valencia substation in Nogales, as shown in the following Table 1.2-2.

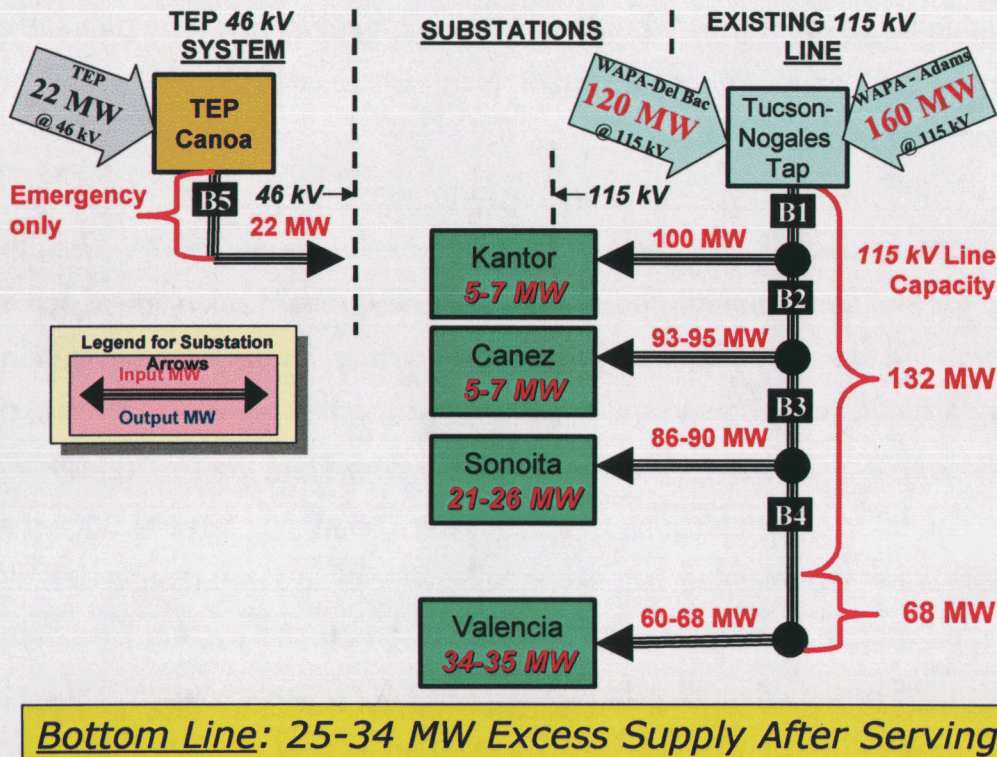


Figure 1.2-4 Supply versus Demand for the Santa Cruz Grid with the Existing 115 kV Transmission Line. Each Substation is provided with an adequate supply from the Existing 115 kV Transmission Line, with a Significant Supply Margin at all substations.

Table 1.2-2 – Estimates of the Range of Supply Margins at Each Substation for Existing 115 kV. The 46 kV is for backup or emergencies and is *not* included.

Substation	Estimate Supply Available (range)	Estimate Load Demands (range)	Supply Margin Excess (MW)	Supply Margin in Percent
Nogales Tap	120-160 MW	100 MW*	20-60 MW	120-160%
Kantor	100* MW	5-7 MW	93-95 MW	1,329-1,900%
Canez	93-95 MW	5-7 MW	86-90 MW	1230-1800%
Sonoita	86-90 MW	21-26 MW	60-69 MW	231-329-%
Valencia	60-68 MW	34-35 MW	25-34 MW	71-100%
Totals	100 MW*	70 kW	30 MW	30%

A. In addition to the Nogales Tap source of power, there are three 18-MW (48 MW) of power from the combustion turbines at the Valencia Substation. This is easily enough to meet the power demands of the City of Nogales via the Valencia Substation with some 13 MW (48-35) of excess for substations to the north. Thus, under normal conditions, there is a total of from 100 MW to 148 MW of power available to the Santa Cruz grid. All customer's power needs can be met.

The existing 115 kV line, when it is limited by its thermal rating, has a capacity of 132 MW, except for the last 4.8 miles north from the Valencia Substation. That last section has a thermal rating at 68 MW thereby limiting its normal capacity to 68 MW. This conductor wire (4/0) was not re-conducted during the 1988 upgrades when a higher capacity rated line was installed for the rest of the 115 kV transmission line. Note this really is not a limitation because there presently is a 194% (68/35) supply margin for the City of Nogales. Good practices call for about 10-20% reserve margin. The substations' reserve margins are shown in Table 1.2-3 below when considering the 115 kV line plus the 48 MW turbines.

The City of Nogales (Valencia Substation) has an inherent reserve with between 38 % (= 13/34) and 40 % (=14/35) because the turbines can meet these estimated peak demands.

Table 1.2-3 Power Reserve Margins for Each Substation under Normal Conditions and with turbines on line. Note ample power reserve is always available under normal operating conditions when 100 MW is available and after loss of power have been taken into account at the Nogales Tap.

Power Reserve Margin	Substation			
	Kantor	Canez	Sonoita	Valencia
Supply Reserve (in MW)	93-95 MW	86-90 MW	60-69 MW	25-34 MW
Supply Reserve (in %) from 115 kV	1,329-1,900%	1230-1800%	231-329%	71-100%
Supply Reserve with 3 x 16 MW turbines (in MW)	93-95 MW	86-90 MW	65-83 MW	38-48-MW
Supply Reserve with 3 turbines (in %)	1,329-1,900%	911-1,271*	241-395%	109-141%

Note: Turbines are not necessary and not required to be used, based on the capabilities associated with the existing 115 kV transmission line.

Note the turbines are not used for the Kantor or Canez substations since the 46 kV line provides sufficient power for these two substations.

The Sonoita Supply Reserve from the 115 kV line is from Table 1.2-2 in MW and %. Sonoita Supply Reserve with 3 turbines considers the remaining power from the 48 MW from turbines minus the 30-35 MW Valencia load or and additional 13 to 14 MW for Sonoita added to that from the 115 kV line or 65 to 83 MW. The resulting supply reserve lower limit is $65/27 = 241\%$ and upper limit is $83/21 = 395\%$.

The Valencia Supply Reserve from the 115 kV line is between 25 and 34 MW, and when adding the 13 to 14 MW of excess supply at the Valencia substation, its total Supply Reserve is between 38 (25+13) and 48 MW (34+14).

b. Second Replacement:

Please insert the below in place of the existing Figure 5.4-3 and caption on the original page 67.

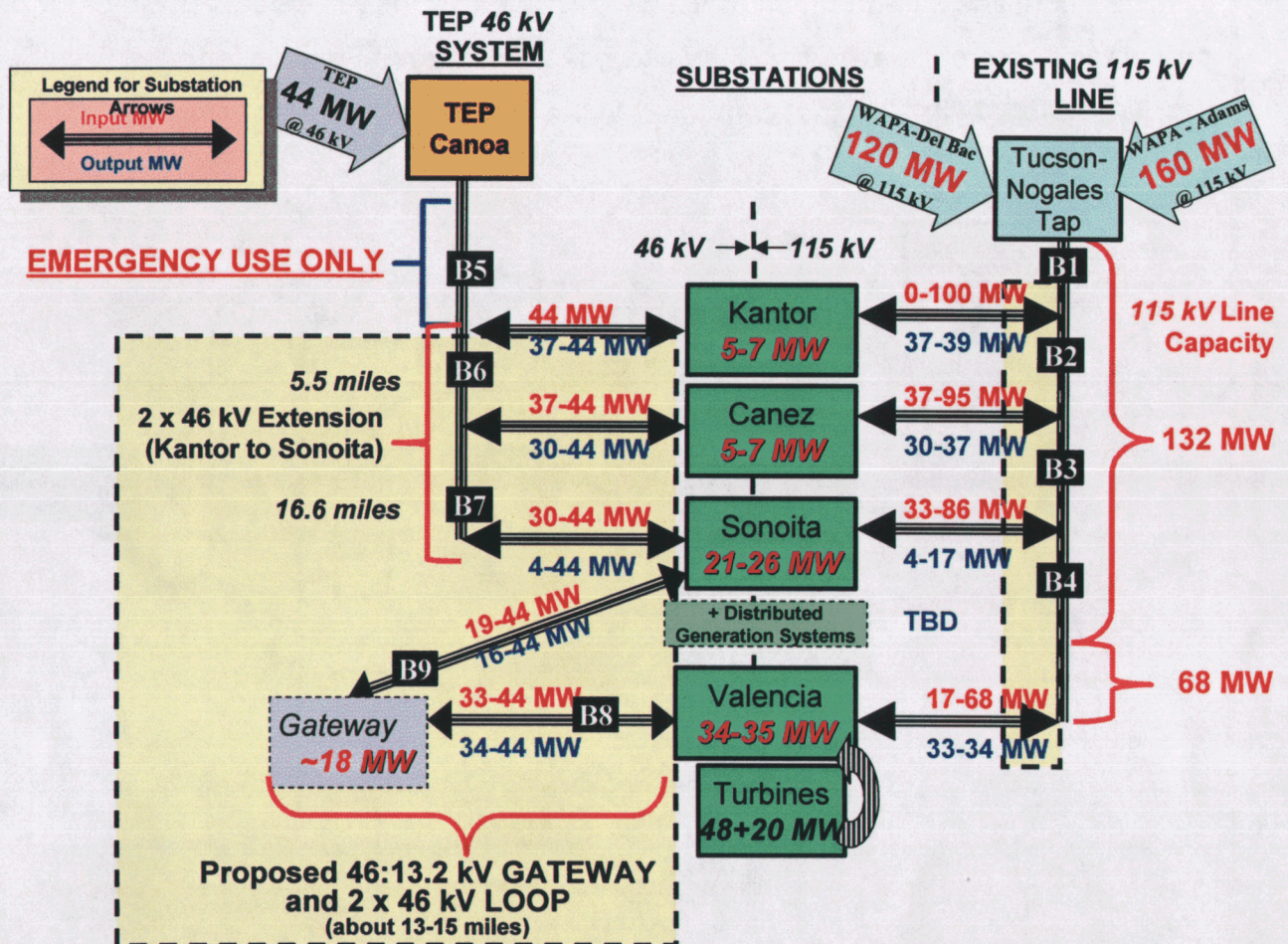


Figure 5.4-3 ALTERNATIVE Option One showing the Extension from Kantor to Sonoita and the "Nogales Loop." All transmission lines are double-circuit 46 kV lines. In addition, remote controlled, automated switches should permit additional flexibility to provide the estimated ranges of power to each substation depending upon locations of failure shown as B1 to B9 in the figure

c. Third Replacement.

Please insert the next six pages in place of the original pages 70, 71, 72 and 73.

Part VI – Trade Off between the TEP and the ALTERNATIVE.

This part contains a trade-off analysis, which compares the ALTERNATIVE with other options presented, the proposed TEP 345 kV line, the Beck Interim Solution, and the Rich Solution. The TEP 345 kV line scheme, compared to the existing grid, is shown in Figure 6-1 below.

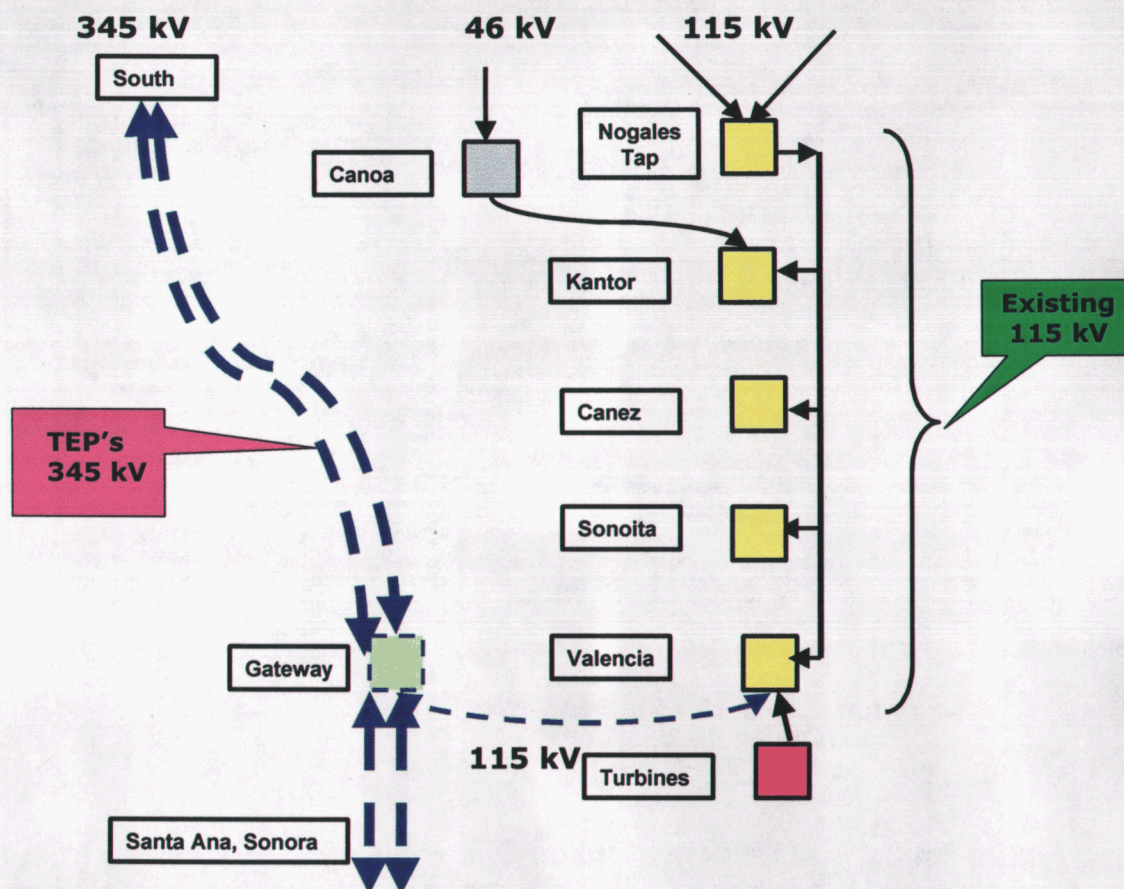


Figure 6-1 *The proposed TEP 345 kV lines to Mexico, include a new 345:115 kV Gateway Substation and 115 kV line to the Valencia Substation.*

6.1 Methodology for Analysis.

- a. This Trade-study compares a series of characteristics and associated requirements for multiple options. Since PNM has withdrawn its applications and the Citizens four alternatives are now mute, only the ALTERNATIVE above and TEP's 345 kV proposal remained. TEP, in Mr. Beck's Testimony, proposed an "interim solution" in its

Testimony, and the Rebuttal by Mr. Rich another. These four are used in the updated Benefit-Analysis study.

- b. All three of ALTERNATIVE Options are included in this Trade Study. The TEP 345 kV transmission line project presently has no approved routes, so the preferred Western Route information will be used in the comparison. Mr. Beck's Testimony for in "interim solution" is an upgrade to the existing transmission line and the addition of a 20 MW of local generation capability in Nogales. Mr. Rich's Rebuttal expands Mr. Beck's "interim solution" with a solution that will double-circuit the existing transmission line with a 138 kV line and also use the 20 MW turbines in Nogales.

6.2 Evaluation Factors.

In order to conduct a Trade Off Study, one needs to determine the desired second transmission line characteristic factors and requirements so various solutions can be compared. For a second transmission line, the following characteristic factors and requirements were selected and given a relative weight, where 0 is of lowest importance and 10 is of highest importance. Each proposed solution is compared and assigned a "score" with the highest score being the "best value" solution. Table 6.2-1 provides a list of evaluation factors, preferred objective requirements and relative weights when compared to other factors. Table 6.2-2, compares both the Alternative Option 3 with the TEP 345 kV Western route, scores each and gives a total for each solution.

Table 6.2-1 Characteristic Evaluation Factors, Requirements and Weights use to Conduct a Trade Study for the Second Transmission Line in Santa Cruz County.

Characteristic Factors	Transmission Line Preferred Requirements	Weight
1. Length	From Second Source to Santa Cruz Grid (shorter preferred)	4
2. Line Power Capacity	In Megawatts (peak) to meet Santa Cruz needs (100)	6
3. Physical characteristics	In terms of height (lower preferred)	7
4. Right of Way	Width (narrower preferred)	5
5. Roads	Required to construct and for maintenance (minimal preferred)	8
6. NERC Reliability	In terms of Contingencies (at least N-1, most is N-2)	10
7. Line Electricity	Line Voltage (higher reduces losses, lower has less EMF)	3
8. Capital Costs	For each major transmission line segment and generation	9
9. Financing	Probably Funding source (future rate case dependent)	2
10. IRS Two-County or complex funding	Impacts on operation of line (none preferred)	2
11. Impact on landowners	Eminent domain and potential law suits (none preferred)	9
12. Development Time	To complete (24 or less months preferred)	10
13. Cost to Customers	In terms of increased rates (less than \$10/month, with \$5 preferred)	10

Table 6.2-1 Characteristic Evaluation Factors, Requirements and Weights use to Conduct a Trade Study for the Second Transmission Line in Santa Cruz County.

Characteristic Factors	Transmission Line Preferred Requirements	Weight
14. Impact on Environment	Based on route, right of way, and significant environmental damage (minimal, preferably none)	9
15. Permits necessary to start construction	Necessary actions to start construction (low complexity of permitting preferred)	6
		Total points 100

Table 6.2-2 shows the two proposed solutions including the Proposed 345 kV Western Route versus the ALTERNATIVE Options 1 (O1), Option 2 (O2), and Option 3 (O3), when different, evaluates a score for each, and totals the points for each solution.

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Table 6.2-2 Trade-Off Analysis of Four Proposed Solutions For the Second Transmission Line.

Factor (weight)	ALTERNATIVE Options (O1, O2, O3)	Score	TEP's Interim Solution	Score	Rich's Solution	Score	Proposed 345 kV Western Route	Score
1. Length (4 points)	Extension for 16.6 miles to S. Rio Rico, plus 13.0 miles Nogales Loop Total 29.6 miles of 46 kV	4	About 65 miles (Vail to Nogales Tap, Nogales Tap to Valencia) Plus a 2 nd transmission line	1	About 65 miles (Vail to Nogales Tap, Nogales Tap to Valencia)	2	60 miles of 345 kV South to Gateway plus 3.5 miles of 115 kV to Valencia 60 miles of 345 kV to Santa Ana (unfunded) Total 120 miles of 345 kV, 3.5 miles 115 kV	1
2. Line Power Capacity (6 points)	22 MW (single circuit) 44 MW (double circuit) May consider higher power capabilities (100 MW), if needed	5	>100 MW transmission (one 138 kV circuit) Plus a 2 nd transmission line is needed	2	>200 MW transmission (~100 MW per 138 kV circuit)	6	500 to 1,000 MW per circuit 1000 to 2,000 MW total Gateway's 115 kV limited	5
3. Physical characteristics (7 points)	50-60 foot telephone poles 3 conductors, plus a grounding wire	7	~80 foot monopoles (3 conductors plus 1 grounding wire) No H-frames	5	~100 foot monopoles (6 conductors plus 2 grounding wires) No H-frames	4	140-145 foot monopole and lattice towers 12 conductors, two grounding wires Corrosion impacts on EPNG line are unknown	2
4. Right of Way (5 points)	Estimate 25 feet Uses mostly existing railroad utility easement, Santa Cruz County-level decision, not ACC or Line Siting Committee	5	Estimate 50 feet, existing except new for Vail to Nogales Tap (needs CEC) Needs 2 nd transmission line ROW	0	Estimate 50 feet, existing except new for Vail to Nogales Tap (needs CEC)	3	Up to 250 feet, or more, if near existing natural gas line (exact easements TBD) New right of way required for 3 rd 115 kV transmission line plus new CEC	2
5. Roads (8 points)	Insignificant if railroad easement used	8	Use existing transmission line roads (except new for Vail to Nogales Tap) Needs roads for 2 nd transmission line	1	Use existing transmission line roads (except new for Vail to Nogales Tap)	7	At least 25 miles of new roads in "roadless" part of Coronado National Forest (a major environmental issue)	1
6. NERC Reliability (10 points)	N-1 for all substations and transmission lines All meet most N-2 criteria	8	N-1 for transmission lines, no improvements for 3 distribution substations (N-0) Needs 2 nd transmission line	2	N-1 for transmission lines, no improvements for 3 distribution substations (N-0)	6	N-1 for all transmission lines Gateway 115 kV to Sonoita for N-1 needs a third 115 kV line Not yet requested from Line Siting Committee, will need ACC approval	6
7. Line Electricity (3 points)	46,000 volts Lower EMF Distribution losses unchanged	2	138,000 volts About 2% savings in line losses compared to 115 kV Distribution losses unchanged.	1	138,000 volts x 2 About 2% savings in line losses compared to 115 kV Distribution losses unchanged.	2	345,000 volts Lowest power losses about 3% savings. Distribution power losses remain unchanged	3

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Table 6.2-2 Trade-Off Analysis of Four Proposed Solutions For the Second Transmission Line.

Factor (weight)	ALTERNATIVE Options (O1, O2, O3)	Score	TEP's Interim Solution	Score	Rich's Solution	Score	Proposed 345 kV Western Route	Score
8. Capital Cost (9 points)	Options 1 and 2 \$1.9 million to Amado \$5.0 million to Sonoita (est.) \$5.0 million for Nogales Loop \$2.0 million for Gateway (115-46) \$13.9 million (Option 1) + 115 kV to Gateway \$3 million or \$ 16.9 million (Option 2) + 60 MW power plant, + \$30 million, total = \$ 46.9 million (Option 3)	9 (O1) 7 (O2) 5 (O3)	138 kV upgrades + Vail \$ 19.9 million for line \$ 2.1 million for substations \$ 22.0 million for total Upgrade + 20 MW Generation: \$ 13.0 million \$ 45.0 million (interim solution) + New 138 kV line (the 2 nd line) \$37.0 million Total = \$82.0 million	0	Double 138 kV upgrades: \$19.9 million + 40% (2 nd line) = \$ 27.8 million + 20 MW Generation + \$13.0 million Total \$ 40.8 million	5	\$111.0 million to Gateway - Valencia - Mexico \$60 million to Santa Ana (TBD) \$171.0 million plus 13+% FERC = \$ 185.4 million for Guaranteed ROI (FERC reimburses developing and environmental including permitting and environmental studies) Plus \$3+ million for 2 nd 115 kV to Gateway Total = \$ 188.4 million SCC share is 20% of \$128.4 million = \$25.68 million	3
9. Financing (2 points)	UNE Electric rate payers Clearer issue for utility financing No FERC wheeling charges	2	Transmission - TBD by rate case, pole replacement should be a routine maintenance task Generation, USNE ratepayers	1	Transmission - TBD by rate case, pole replacement should be a routine maintenance task Generation, USNE ratepayers	1	Unclear - ratepayers (\$20 million or 20%?), shareholder, venture partners, FERC (13+% ROI), Mexico (?) What is Mexican impact? Higher wheeling charges than 115 kV line	0
10. IRS Two-County or complex funding (2 points)	46 kV to Conoa for emergency, not for routine operations in Pima County (in TEP service area) Unlimited use inside Santa Cruz County (in UNSE service area)	2	Can be used for an emergency, not for routine operations from TEP service area until Vail-Nogales Tap 345:138 transformer is installed, then no 2-county restrictions. Needs 2nd transmission line	1	Can be used for an emergency, not for routine operations from TEP service area 345 kV was never to be a primary power source for Santa Cruz County, for backup, emergencies only.	2	Can be used for an emergency, not for routine operations from TEP service area 345 kV was never to be a primary power source for Santa Cruz County, for backup, emergencies only.	1
11. Impact on land-owners (9 points)	Minor, if any, unless completely new easement required Extension and Nogales Loop opposition unknown since the routes are unknown to public Avoids many impacted areas	7	None, except during construction Removes all H-Frames 2nd transmission line impacts unknown	1	Higher towers Removed all H-Frames	8	Approximate 13-15 homeowners displaced at McGee Ranch, TEP has to condemn and purchase Caterpillar Test Range route outside authorized corridor, may void ACC CEC Marley Ranch (105,000 acres) may not permit to cross property Homeowners being displaced Ruby Airport, impacts on flights Environmental groups and private land holders if Western route is approved Additional homeowners if any Santa Cruz Valley route approved	1

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Table 6.2-2 Trade-Off Analysis of Four Proposed Solutions For the Second Transmission Line.

Factor (weight)	ALTERNATIVE Options (O1, O2, O3)	Score	TEP's Interim Solution	Score	Rich's Solution	Score	Proposed 345 kV Western Route	Score
12. Development Time (10 points)	By end of 2006 in-operation 12-15 months after completion of Docket No. E-01032A-99-0401	10	Needs CEC Estimate 18 months total to upgrade to 138 kV Mid-2006 for 20 MW turbine + Need 2 nd transmission line	2	Needs CEC Estimate 18 months total for double circuit 138 kV Mid-2006 for 20 MW turbine	7	Estimate between 2008 and 2012, depending on various government and private approvals needed Maybe additionally delayed by law suits At least 36 months after re-opening and completing Line Siting Case No. 111	1
13. Cost to Customers (10 points)	Estimate less than \$7/month, ~7% rate increase (increase can be in August 2007 rate case) for Options 1 and 2 Option 3 ~ \$20/month increase Total = \$27/month with Option 3 Utility can collect expenses sooner	9 (O1) 9 (O2) 7 (O3)	Transmission ~ \$15/month if TEP for backup only + double Firm delivery costs (UNK) Generation ~ lower per hour fuel but new capital costs, estimate \$6/month Total may double rates (100% rate increase)	0	Transmission cost is 40% more than for Interim Solution ~ \$21/month Generation, estimate \$6/month Total ~ \$27/month	6	\$15 per month (new wheeling charges) \$15-20 per month, capital costs + 100 MW firm for backup Firm power Total \$30-35 per month/customer (~35% rate increase + backup Firm) (maybe in rate case after Aug. 2007)	2
14. Impact on Environment (9 points)	Minor, if existing ROWs used, such as railroad which has greater environmental impact than line Power plant impacts to environment No NEPA requirements	7 (O1) 7 (O2) 6 (O3)	Transmission ~ no change Generation ~ less air pollution Needs new CEC No NEPA requirements + Need 2 nd transmission line	3	Transmission ~ higher towers? Generation ~ less air pollution Needs new CEC No NEPA requirements	8	Not approved by Coronado National Forest for Western or Crossover Routes Not approved by AZ Land Trust Needs new/Amended CEC for another route May need changes or new EIS	1
15. Permits necessary to start construction (6 points)	State Historical Preservation Office (SHPO) clearance Arizona Land Office permit Santa Cruz County use permits Option 3 (only): Air permits Water permits Gas permits Pima/Santa Cruz County use permits	5 (O1) 5 (O2) 4 (O3)	Transmission: CEC for 138 kV upgrade Arizona Land Office permit SHPO Clearance Pima/Santa Cruz County use permits Generation: Air permits Water permits Gas permits Santa Cruz County use permit NEW CEC For 2 nd transmission line (later?)	1	Transmission: CEC for 138 kV double-circuit upgrade Arizona Land Office permit SHPO Clearance Pima/Santa Cruz County use permits Generation: Air permits Water permits Gas permits Santa Cruz County use permit	5	New or amended CEC required RODs include Mitigation Plans that might not be accepted by TEP USFS, BLM Special Use Permits EPA approval of Final EIS COE Sec. 401/404 permits, 500-yr flood plain for South and Valencia USFWS permit to build roadway Native American Tribal Objections (EPA) FAA Clearances USAF permission to intrude in Ruby MOA Airspace (major F-16 low level training range) DOE Presidential permit including electrical reliability clearance Arizona Land Office permit SHPO Clearance Pima/Santa Cruz County use permits Mexican permits (EIS, etc.)	1
	Total ALTERNATIVE Scores	90 (Option 1) 88 (Option 2) 82 (Option 3)	Total Score for Interim Solution	21	Total Score for Mr. Rich's Solution	72	Total Score for TEP's 345 kV Solution	31

Notes: ALTERNATIVE Options data from Magruder Testimony, Interim Solution from Beck Testimony, Rich's Solution from Rich's Rebuttal, Proposed TEP data from CEC Application and Final EIS.

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e. Pen and Ink Changes to the Magruder Testimony:

Testimony Page	Line Numbers	Paragraph, Figure/Table	Change
13	2	Introduction	Change "TEP-6, TEP-6A" to "TEP-11, TEP-11A"
14	32	Purpose of Testimony	Delete "Part X ... Surrebutal"
15	35	Footnote 7	After "Docket No." add "E-01032C-00-0751)"
77	5	13	Change "meet" to "met"
79	32	77	Change "2017" to "2018"
80	11	86	Change "MW" to "kV"
80	29	97	Add "not" between "does" and "use"
82	36	7.2.1.e	Change "of" to "off"
85	13	7.4	Change "14400" to "14000"
85	16	7.4	Change "14400" to "14000"
87	9	7.4((7)	Change "a. to f." to "(1) to (6)"
90	16	8.6	Before first sentence add "To encourage TEP, which as all responsibilities to design and build the second transmission line, to get implement the ACC Decision in this re-opened hearing, 90 days after it is published, the \$30,000 per month penalty from paragraph 4 of the ACC Staff-Citizens Settlement Agreement approved in ACC Decision No. 62011, will commence." Subparagraph (9) below describes the process to terminate this penalty."
90	26	8.6(3)	Change "Objector" to "Parties"
90	34	8.6(5)	Change "2020" to "2050"